9 HP RIDE-ON TRENCHER

Model 65162

SET UP, OPERATING, AND SERVICING INSTRUCTIONS

WARNING!
IMPORTANT INFORMATION

The Hitch Coupler MUST be properly secured to the hitch ball of the towing vehicle. After assembly and attachment, pull up and down on the Hitch Coupler to make sure the hitch ball is fitting snugly in the Hitch Coupler. **There must be no play between the hitch ball and Hitch Coupler.** If there is play, tighten the Adjustment Nut until no play is present. If the Adjustment Nut is too tight, the Handle will not lock. **Carefully read and follow the complete instructions in this manual BEFORE setup or use.**

If the Coupler is not secured properly, the ball could come loose while the Log Splitter is in motion, possibly causing property damage, SERIOUS PERSONAL INJURY, or DEATH.

Visit our website at: http://www.harborfreight.com

Read this material before using this product. Failure to do so can result in serious injury. SAVE THIS MANUAL.

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For technical questions or replacement parts, please call 1-800-444-3353.

Revised 11a

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EMISSION CONTROL SYSTEM WARRANTY 40

SAVE THIS MANUAL

Keep this manual for the safety warnings and precautions, assembly, operating, inspection, maintenance and cleaning procedures. Write the product's serial number in the back of the manual near the assembly diagram (or month and year of purchase if product has no number). Keep this manual and the receipt in a safe and dry place for future reference.

IMPORTANT SAFETY INFORMATION

In this manual, on the labeling, and all other information provided with this product:

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠DANGER **DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.**

⚠WARNING **WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.**

⚠CAUTION **CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.**

NOTICE **NOTICE is used to address practices not related to personal injury.**

CAUTION **CAUTION, without the safety alert symbol, is used to address practices not related to personal injury.**

WARNING! Read all instructions. Failure to follow all instructions listed below may result in fire, serious injury and/or DEATH. The warnings and precautions discussed in this manual cannot cover all possible conditions and situations that may occur. It must be understood by the operator that common sense and caution are factors which cannot be built into this product, but must be supplied by the operator.

SAVE THESE INSTRUCTIONS

SET UP PRECAUTIONS

1. Gasoline fuel and fumes are flammable, and potentially explosive. Use proper fuel storage and handling procedures. Do not store fuel or other flammable materials nearby.
2. Have multiple ABC class fire extinguishers nearby.
3. This equipment has a spark arresting muffler included. A spark arresting muffler is required by law in California, on some US Forest Service land, and possibly in other areas or situations.
4. Set up and use only on a flat, level, well-ventilated surface.

5. Wear ANSI-approved safety goggles, heavy-duty work gloves, and dust mask/respirator during set up and use.

6. Use only oil and fuel recommended in the “Specifications” section of this manual.

OPERATING PRECAUTIONS

1. **CARBON MONOXIDE HAZARD**
Using an engine indoors CAN KILL YOU IN MINUTES.
Engine exhaust contains carbon monoxide. This is a poison you cannot see or smell.
NEVER use inside a home or garage, EVEN IF doors and windows are open.
Only use OUTSIDE and far away from windows, doors, and vents.

2. Keep children and observers 20 feet away from the equipment while it is operating.

3. Do not leave the equipment unattended when it is running. Turn off the equipment (and remove safety keys, if available) before leaving the work area.

4. Wear ANSI-approved safety goggles and hearing protection during use.

5. People with pacemakers should consult their physician(s) before use. Electromagnetic fields in close proximity to a heart pacemaker could cause pacemaker interference or pacemaker failure. Caution is necessary when near the engine’s magneto or recoil starter.

6. Use only accessories that are recommended by Harbor Freight Tools for your model. Accessories that may be suitable for one piece of equipment may become hazardous when used on another piece of equipment.

7. Stay alert, watch what you are doing and use common sense when operating a piece of equipment. Do not use a piece of equipment while tired or under the influence of drugs, alcohol or medication.

8. Do not overreach. Keep proper balance at all times. This enables better control of the equipment in unexpected situations.

9. Dress properly. Do not wear loose clothing or jewelry. Keep hair, clothing and gloves away from moving parts. Loose clothes, jewelry or long hair can be caught in moving parts.

10. Parts of the equipment, especially exhaust system components, get very hot during use. Stay clear of hot parts.

11. Do not cover the engine or equipment during operation.

12. Keep the equipment, engine, and surrounding area clean at all times.

13. Use the equipment, accessories, etc., in accordance with these instructions and in the manner intended for the particular type of equipment, taking into account the working conditions and the work to be performed. Use of the equipment for operations different from those intended could result in a hazardous situation.

14. Do not operate the equipment with known leaks in the engine’s fuel system.

15. This product contains or, when used, produces a chemical known to the State of California to cause cancer and birth defects or other reproductive harm. (California Health & Safety Code § 25249.5, *et seq.*)

16. When spills of fuel or oil occur, they must be cleaned up immediately. Dispose of fluids and cleaning materials as per any local, state, or federal codes and regulations. Store oil rags in a bottom-ventilated, covered, metal container.

17. Keep hands and feet away from moving parts. Do not reach over or across equipment while operating.

18. Before use, check for misalignment or binding of moving parts, breakage of parts, and any other condition that may affect the equipment's operation. **If damaged, have the equipment serviced before use.** Many accidents are caused by poorly maintained equipment.

19. Use the correct equipment for the application. Do not modify the equipment and do not use the equipment for a purpose for which it is not intended.

SERVICE PRECAUTIONS

1. Before service, maintenance, or cleaning:

a. Turn the engine switch to its "OFF" position.

b. Allow the engine to completely cool.

c. Then, remove the spark plug wire(s) from the spark plug(s).

2. Keep all safety guards in place and in proper working order. Safety guards include muffler, air cleaner, mechanical guards, and heat shields, among other guards.

3. Do not alter or adjust any part of the equipment or its engine that is sealed by the manufacturer or distributor. Only a qualified service technician may adjust parts that may increase or decrease governed engine speed.

4. Wear ANSI-approved safety goggles, heavy-duty work gloves, steel toe work boots, dust mask/respirator and hard hat during use and service.

5. Do not allow the hydraulic hose to come in contact with any hot part of the unit. The hose might be damaged, possibly causing it to burst or leak under high pressure.

6. Maintain labels and nameplates on the equipment. These carry important information. If unreadable or missing, contact Harbor Freight Tools for a replacement.

7. Have the equipment serviced by a qualified repair person using only identical replacement parts. This will ensure that the safety of the equipment is maintained. Do not attempt any service or maintenance procedures not explained in this manual or any procedures that you are uncertain about your ability to perform safely or correctly.

8. Store equipment out of the reach of children.

9. Follow scheduled engine and equipment maintenance.

Refueling:

1. Do not smoke, or allow sparks, flames, or other sources of ignition around the equipment, especially when refuelling.
2. Do not refill the fuel tank while the engine is running or hot.
3. Do not fill fuel tank to the top. Leave a little room for the fuel to expand as needed.
4. Refuel in a well-ventilated area only.

TRENCHER PRECAUTIONS

1. Always make sure the hitch coupler is securely fixed to the vehicle before moving it. If the Coupler is not secured properly, the link could come loose while the trailer is in motion, possibly causing property damage, SERIOUS PERSONAL INJURY, or DEATH.
2. Contact local utility companies before beginning any project. Buried utility lines may not be marked and, if struck, can cause SERIOUS PERSONAL INJURY or DEATH.
3. WARNING: Some dust created by power sanding, sawing, grinding, drilling, and other construction activities, contains chemicals known [to the State of California] to cause cancer, birth defects or other reproductive harm. Some examples of these chemicals are:
   • Lead from lead-based paints
   • Crystalline silica from bricks and cement or other masonry products
   • Arsenic and chromium from chemically treated lumber
   Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: work in a well ventilated area, and work with approved safety equipment, such as those dust masks that are specially designed to filter out microscopic particles. (California Health & Safety Code § 25249.5, *et seq.*)
4. Never place your hands or body near a hydraulic fluid leak. High-pressure fluid can be forced under the skin resulting in serious injury.
5. Do not exceed 30 MPH when towing the Trencher.
6. Do not tow the Trencher on roads or highways. This product is not D.O.T. compliant, and is not road legal.

SAVE THESE INSTRUCTIONS.

BASIC SPECIFICATIONS

Fuel	Type	86+ octane unleaded gasoline
	Capacity	1.58 Gallons
Engine Oil	Type SAE	10W 30 above 32° F 5W30 at 32° F or below
	Capacity	1.2 Quarts
Hydraulic Oil		3.5 Gallons
Engine Speed		3,600 RPM
Engine Family		6CGP.2702GA
Tire Inflation		65 PSI
Digging Depth		5-1/2 and 7 Feet Deep
Maximum Digging Reach		8 Feet
Spool Valve		Rated 10.6 G.P.M.
Pump		Rated 2.7 G.P.M.
Boom Travel		60° Left/Right
Bucket Load Capacity		1.24 Cubic Feet
Hitch Ball size		1-7/8" Diameter

Note: Additional specifications found in the TECHNICAL ENGINE SPECIFICATIONS chart in this manual.

The emission control system for this product's Engine is warranted for standards set by the U.S. Environmental Protection Agency and by the California Air Resources Board (also known as CARB). For warranty information, refer to the last pages of this manual.

At high altitudes, the engine's carburetor, governor (if so equipped), and any other parts that control the fuel-air ratio will need to be adjusted by a qualified mechanic to allow efficient high-altitude use and to prevent damage to the engine and any other devices used with this product.

UNPACKING

When unpacking, check to make sure that the item is intact and undamaged. If any parts are missing or broken, please call Harbor Freight Tools at the number shown on the cover of this manual as soon as possible.

SET UP INSTRUCTIONS

Read the ENTIRE IMPORTANT SAFETY INFORMATION section at the beginning of this manual including all text under subheadings therein before set up or use of this product.

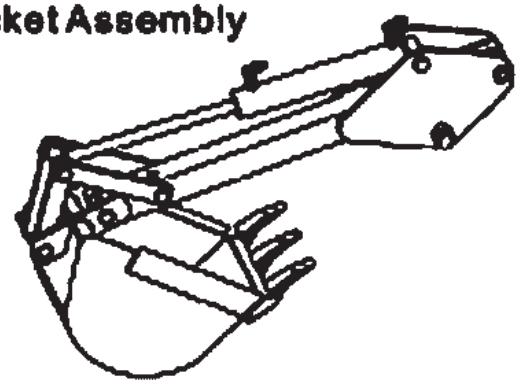
⚠WARNING **Risk of accidental starting; resulting in serious personal injury. Turn the Power Switch of the equipment to its "OFF" position, wait for the engine to cool, and unplug the spark plug wire(s) before assembling or making any adjustments to the equipment.**

Note: For additional information regarding the parts listed in the following pages, refer to the Assembly Diagram near the end of this manual.

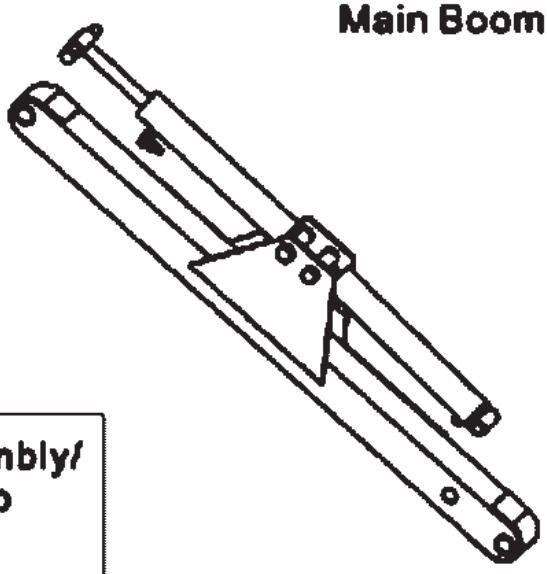
Assembly

1. This equipment has a spark arresting muffler. A spark arresting muffler is required by law in California, on some US Forest Service land, and possibly in other areas or situations.
2. Due to the size of the Trencher and its components, assistance may be required during the entire assembly process.
3. Use jacks (not included) to evenly raise the Frame Assembly (90) & support with jack stands (not included).

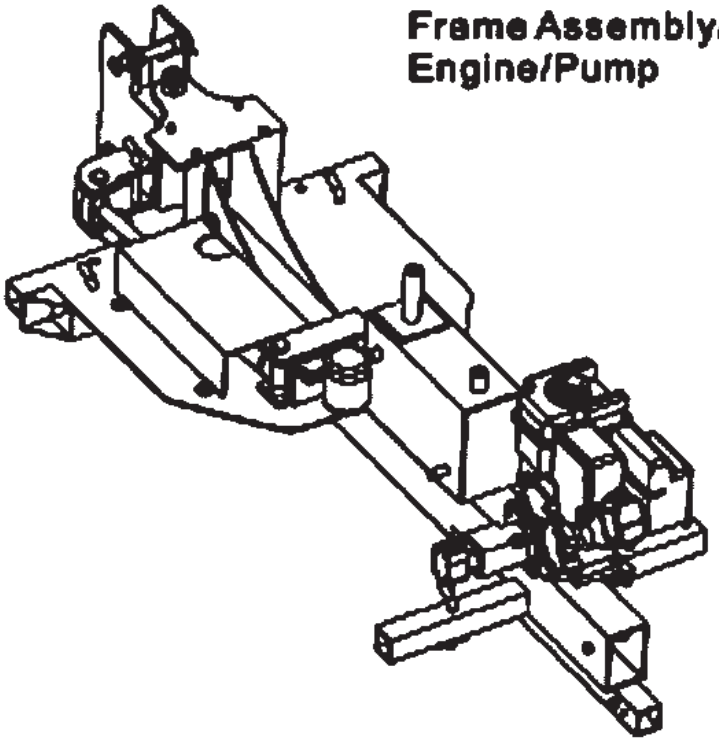
Bucket Assembly



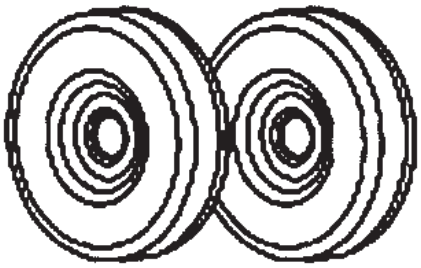
Main Boom



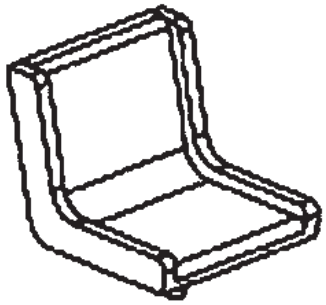
Frame Assembly/
Engine/Pump



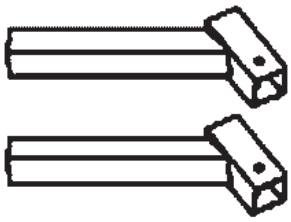
Tires



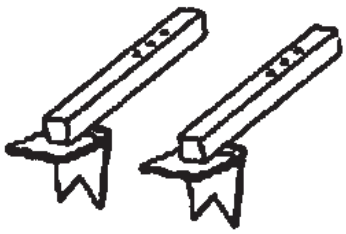
Bucket Seat



Axle & Hub



Leg extension



Leg Assembly

Control Panel

4. Mount both Axles (50) near the boom end of the frame and secure with Lock Pins (82).

5. Place a Tire (52) over the four studs on each Hub. Secure the Tires to the Hubs, using four Lug Nuts (53) per Tire. The lug nuts must be snug. Inflate the tires to 65 PSI.

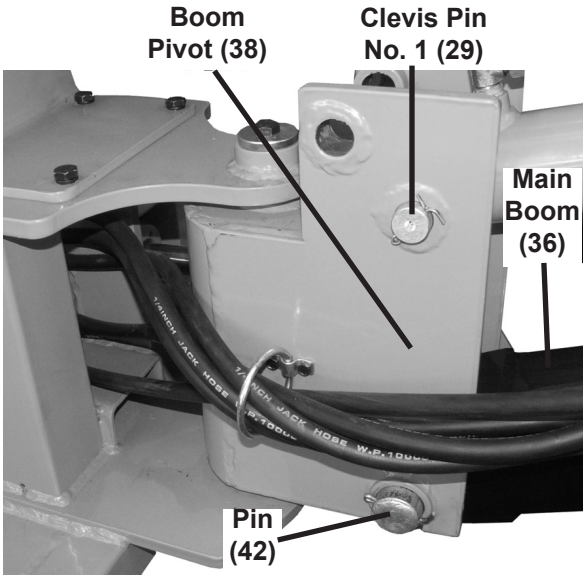
6. Slightly raise the Jacks, remove the Jack Stands, then lower the Jacks. Block the tires and tighten the Lug Nuts to at least 90 Ft-Lbs.

7. Attach Seat (73) to the Seat Bottom Plate (10) and secure both Seat and Plate to the post on top of Hydraulic Oil Tank.

8. Attach the Control Support (3) to the Frame Assembly (90) using four Hex Bolts (81).

NOTE: The Hydraulics of this unit are tested before shipment. There may be hydraulic fluid present in components. Assemble the unit in an area that will not be damaged by leaking hydraulic fluid. It is recommended that you wrap rags securely over the Hydraulic connectors on all the Cylinders during assembly. Wear splash-resistant ANSI approved safety goggles and other protective gear to prevent injury from leaking fluid.

9. Attach the Main Boom (36) to the Boom Pivot (38) using the Pin (42) through the bottom hole and Clevis Pin No. 1 (29) through the upper hole. Secure both pins with Hair Pin Clip (31); Pin (42) requires one Cotter pin on each end. See photo above right.



10. Mount the Boom Extension (34) to the Main Boom (36) using the Pin (42), left, and Clevis Pin No. 1 (29), top. Secure both pins with Hair Pin Clip (31).

11. Attach the Hitch Coupler (58) to the Frame Assembly (90) under the Engine (74) using Hex Bolts (75) and Hex HD. Bolt (72).

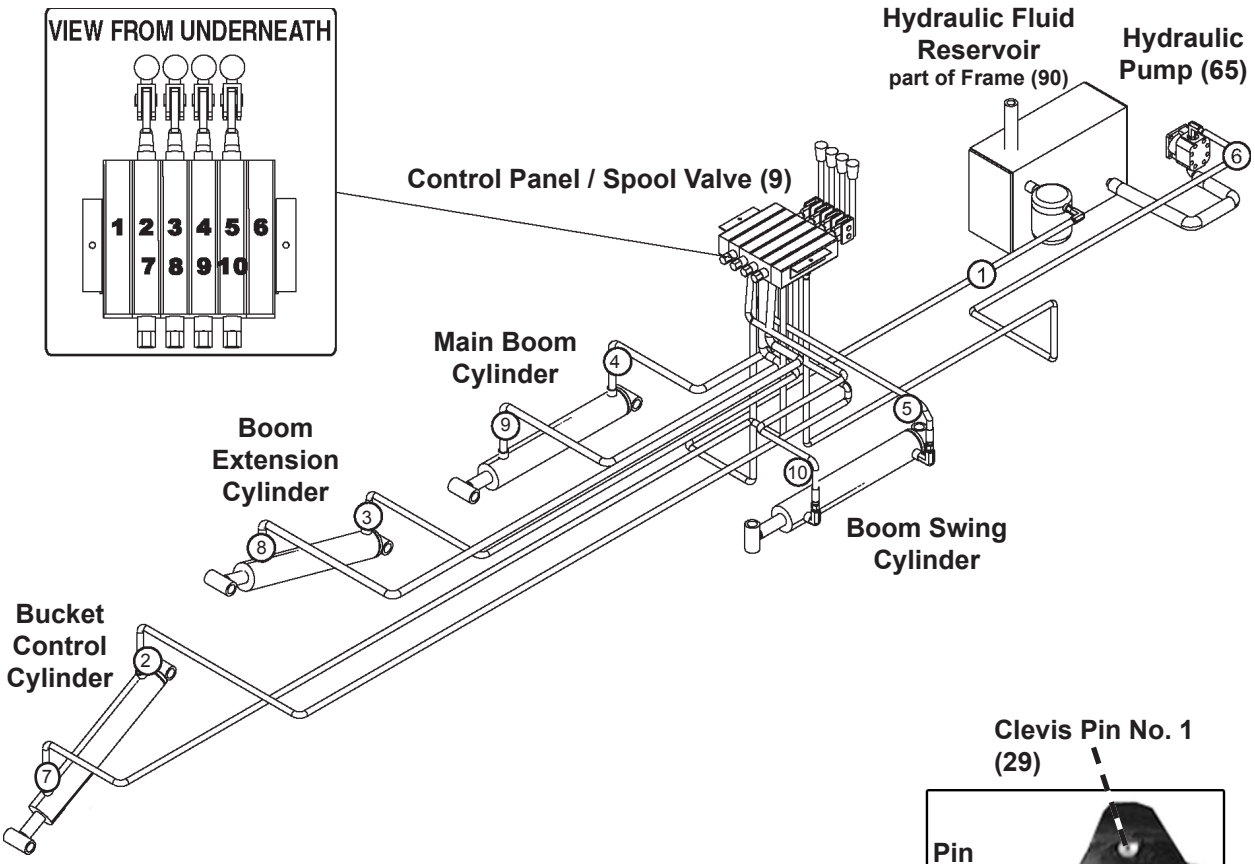
12. Connect, tighten, and check all hydraulic hose fittings to the proper connections, as shown in the Hose Connection Diagram. Hoses and fittings are numbered. Tighten all fittings.

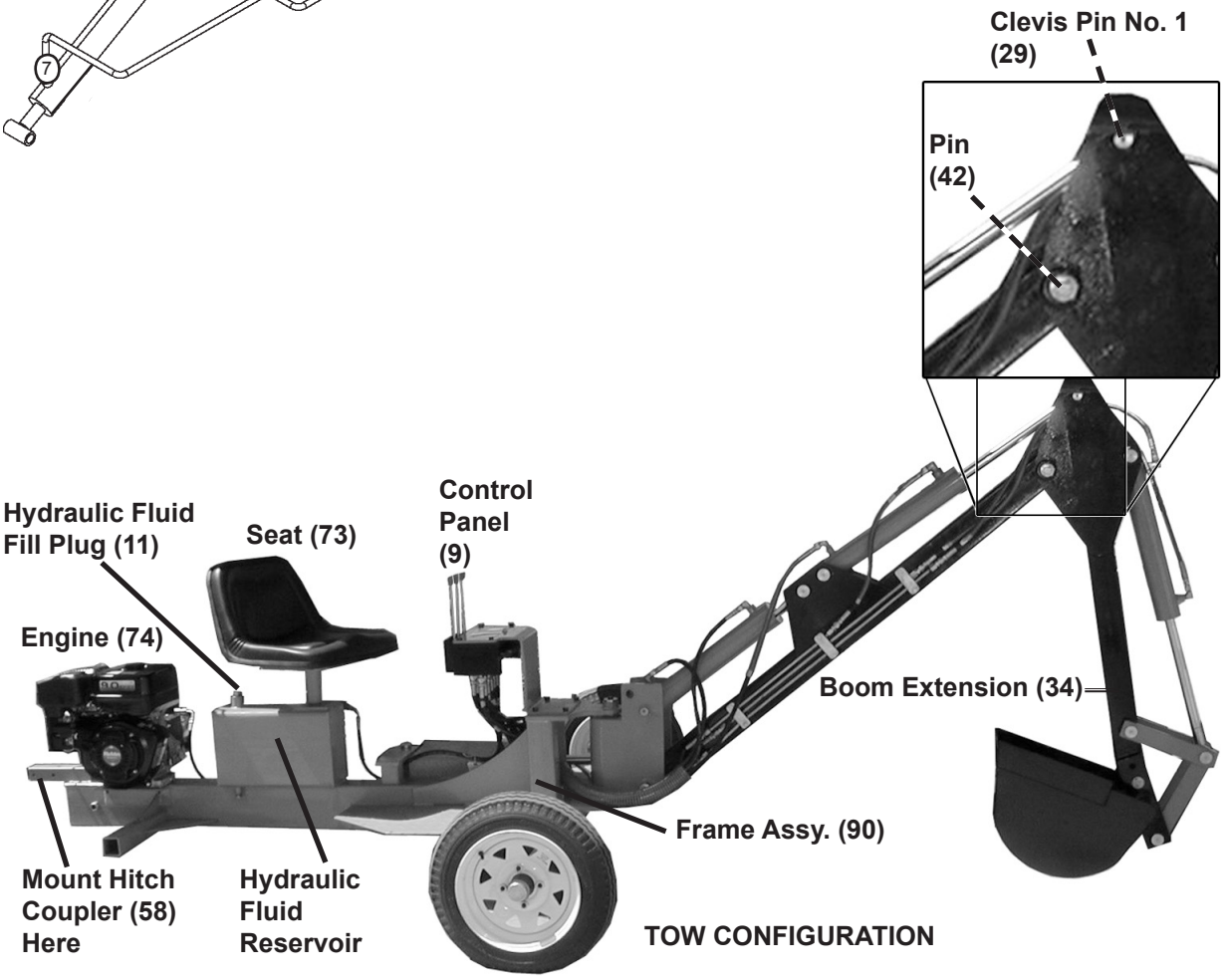
13. Open the Hydraulic Fluid Fill Plug (11). Top off the Hydraulic Fluid Reservoir with high quality hydraulic fluid. Check that the Fluid level is between the lines on the attached Dipstick. Close the Hydraulic Fluid Fill Plug securely.

Attaching the Leg Assembly

1. To use the Trencher, the Leg Assemblies must be installed next to the Boom (36), and the Wheels and Axles (50) moved to the rear.

Hose Connection Diagram





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2. Move the Trencher to the work area (See “Starting The Engine” - page 14).

3. Start the engine and use the Boom Controls to curl the bucket toward the boom without touching the ground. Moving the Bucket Assembly (32) down to the ground will raise the Frame Assembly (90). Lift the Tires just off the ground and stop.

4. Ensure the controls will not be touched or bumped, and that the Trencher will remain motionless. Never place any part of your body under the trencher.

5. With the Tires (52) off the ground, remove the Wheel and Axle (50) to the operator’s left and replace with the left side Extension Leg (19) and Leg Assembly (24). Direct the Extension Leg so it turns toward the Bucket end of the Trencher. Secure with Lock Pin No. 2 (82). Repeat procedure for the right side. Raise Bucket Assembly again to lower onto Leg Assembly, and turn Engine off.

6. Using a jack and jack stands (not included), raise up the engine end of the trencher and disconnect from the towing hitch. Slide the Wheels and Axles (50) into the engine end of the Frame (90). Secure each axle with Lock Pin No. 2 (82).

Purging the Cylinder

1. Remove all Safety Locking Pins (15), disengage the Safety Latch (41) and loosen Hydraulic Tank Fill Plug (11).

2. Press forward on the Boom Swing Lever (located on Control Panel (9) until the Boom stops moving, then pull back on it until it moves in the other direction. Center the Boom.

3. Press forward on the Main Boom Lever until the Main Boom is fully raised. Then, press Forward on the Boom Extension Lever until the Boom is fully extended.

4. Press forward on the Bucket Lever until the bucket is fully extended. Pull back on the lever to retract it fully.

5. Pull back on the Boom Extension Lever until the Boom is pulled back all the way. Pull back on the Main Boom Lever until the Main Boom is lowered completely.

6. Adjust the boom back to its rest position and replace all locking devices.

7. Shut off the Engine, check the Hydraulic Fluid level and refill as necessary.

8. Note: The Fill Plug is vented. When tightening the Fill Plug, tighten it securely then back it off slightly.

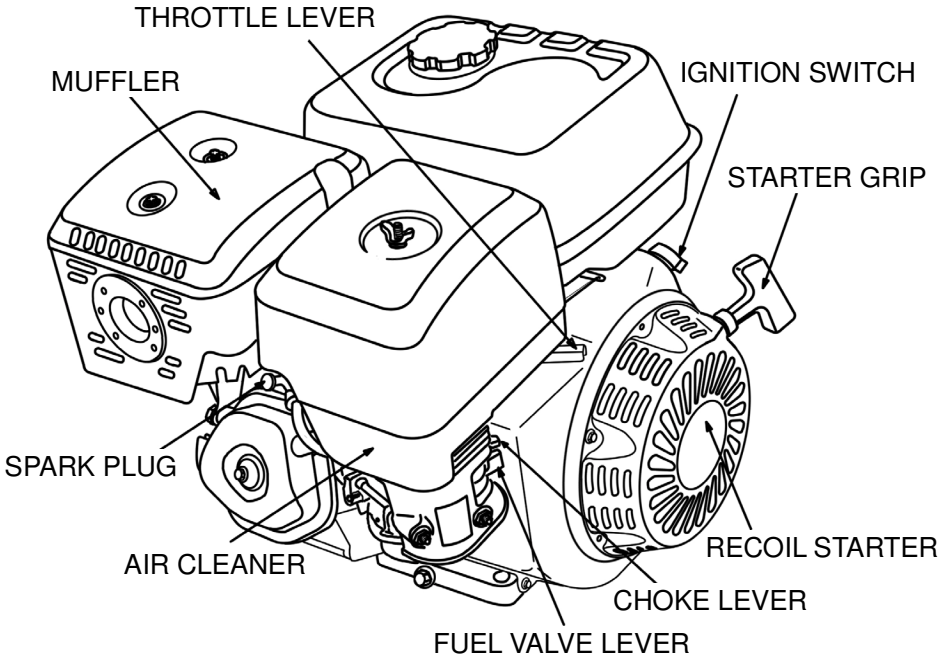
OPERATING INSTRUCTIONS

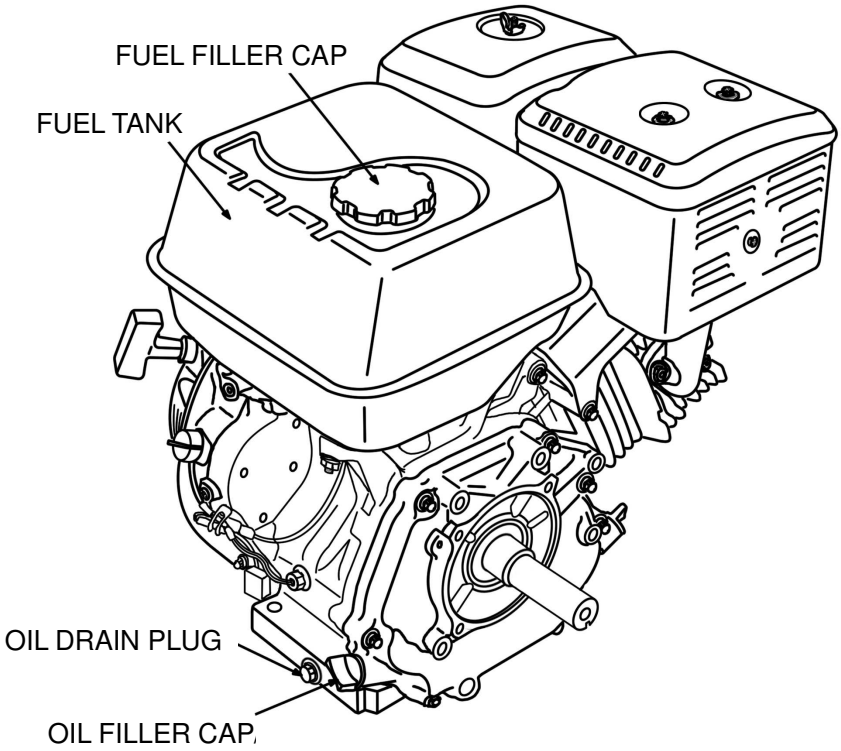
Read the ENTIRE IMPORTANT SAFETY INFORMATION section at the beginning of this manual including all text under subheadings therein before set up or use of this product.

Starting the Engine

Inspect engine and equipment looking for damaged, loose, and missing parts before set up and starting. If any

ENGINE DIAGRAM





problems are found, do not use equipment until fixed properly.

Checking Engine Oil Level

CAUTION! Your Warranty is VOID if the engine's crankcase is not properly filled with oil before each use. Before each use, check the oil level. Do not run the engine with low or no engine oil. Running the engine with no or low engine oil WILL permanently damage the engine.

1. Clean the Oil Filler Cap and the area around it.
2. Remove the Oil Filler Cap/Dipstick. Read the engine service manual for the proper way to check the oil level.
3. If the oil level is low, add the proper type and weight. See information below.
   Oil type:
   32° F or above = SAE 10W-30
   Below 32° F = SAE 5W-30.
4. Replace the Oil Filler Cap.

CAUTION! Do not run the engine with too little or too much oil. The engine will be permanently damaged.

Checking Fuel Level

⚠WARNING! To prevent fire, shut the engine off and wait for it to cool before adding fuel. Do not smoke.

1. Clean the Fuel Filler Cap and the area around it.
1. To Check the fuel level, unscrew and remove the Fuel Filler Cap.
2. Mix fuel stabilizer (not included) with 86 octane (or better) unleaded gasoline according to fuel stabilizer directions.
3. Fill the Fuel Tank to about 1 inch under the lip of the gasoline tank with the stabilized unleaded gasoline mixture.
4. Then replace the Fuel Filler Cap.

Start Procedure

Before starting the engine:

a. Follow the Set Up Instructions to prepare the equipment.

b. Inspect the equipment and engine.

c. Fill the engine with the proper amount and type of both fuel and oil.

d. Read the Equipment Operation section that follows.

1. Turn the fuel valve lever to its "OPEN" position.
2. Turn the ignition switch to its ON or RUN position.
3. Then, turn the engine choke lever to its "CHOKE" position. Set the choke lever in the "RUN" position when starting a warm engine.
4. Grasp the starter handle, and pull slowly until resistance is felt. While holding the handle, allow the starter rope to rewind slowly. Then, pull the starter handle with a rapid, full arm stroke. Once again while holding the handle, allow the rope to rewind slowly. Repeat as necessary, until the engine starts.

5. After the engine starts and warms up, slowly move the choke lever to its “RUN” position.

6. IMPORTANT: Allow the engine to run at no load for five minutes with no load after each start-up so that the engine can stabilize.

Break-in Period

1. Breaking-in the engine will help to ensure proper equipment and engine operation.

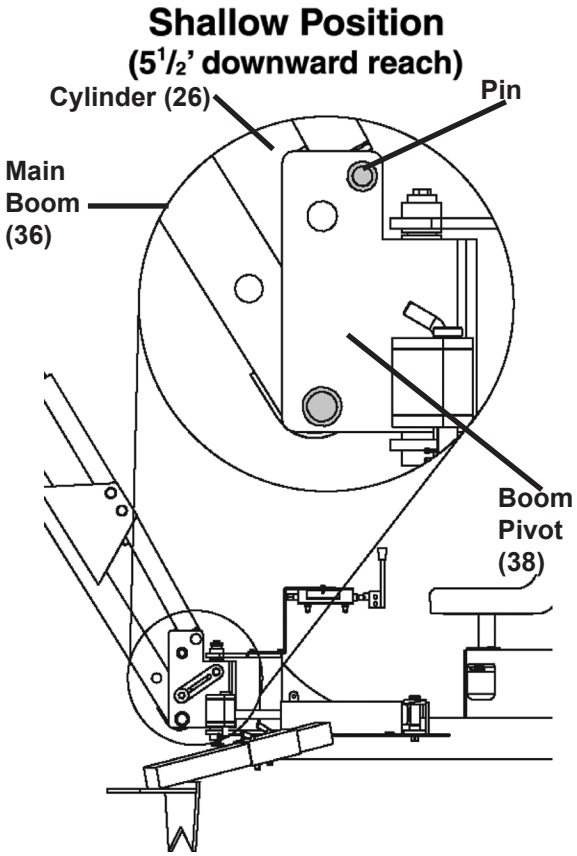
2. The operational break-in period will last about 3 hours of use. During this period:
   - Do not apply a heavy load to the equipment.
   - Do not operate the engine at its maximum speed.

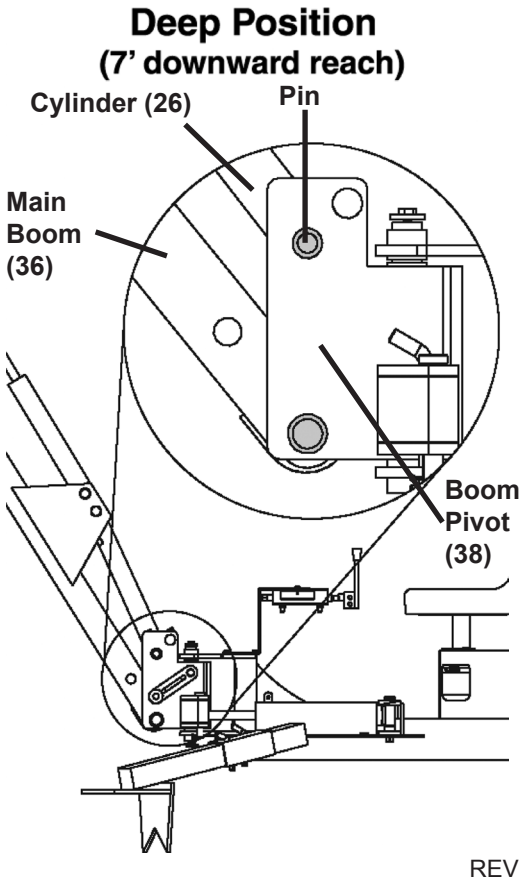
3. The maintenance break-in period will last about 20 hours of use. After this period:
   - Change the engine oil.

   Under normal operating conditions subsequent maintenance follows the schedule explained in the MAINTENANCE AND SERVICING section.

Equipment Operation

1. This Trencher can be used with two arm positions. See illustrations to the right.

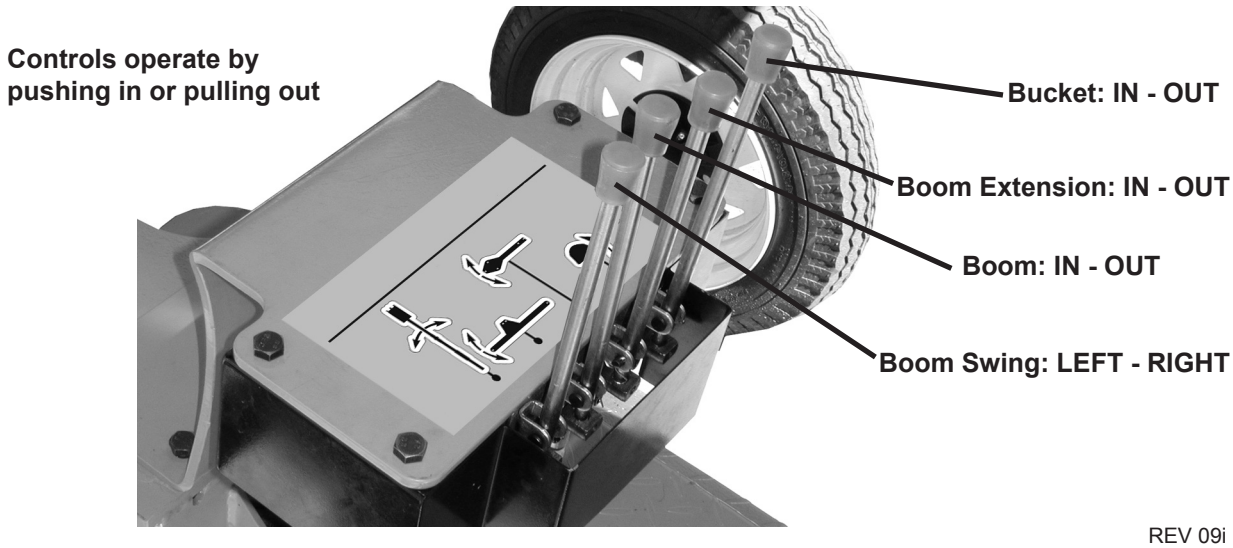




2. While the end of the boom is being supported; remove the Pin (29), align the cylinder with the appropriate hole, insert the Pin (29), and secure it with the Hair Pin Clip (31).
3. With the Engine running, sit in the Operator Seat (73) and pull the Boom Lever control backward to raise the Main Boom (36).
4. Pull back on the Boom Extension handle control to raise the Boom Extension (34).
5. Push forward on the Bucket handle control to open the Bucket Assembly. (32).
6. Push forward on the Boom handle to lower the Boom until the Bucket reaches the ground.
7. Pull back on the Bucket Lever control until the Bucket scoops up the dirt.
8. Pull back on both the Boom and Boom Extension control levers to raise the load.
9. Press in, or push out, the Boom Swing control levers to move the Bucket left or right. Note: The Boom's travel is 60 degrees left and 60 degrees right.
10. Press in on the Bucket control handle to dump the load.

Moving the Trencher

11. One method for moving the trencher around the work area is by using the Boom to push the Trencher across the ground.
12. ⚠ WARNING: This technique can be difficult to control and should only be attempted by an experienced operator. The stability of the Trencher is dependent on the stability of the ground; if you choose to move the Trencher in this way, do so at your own risk. Do not use the Trencher near ditches or drop-offs.
13. Swing the Bucket inward so that the front of the bucket, not the scoop, is facing downward. Press the Bucket down onto a solid piece of ground and press down hard enough to raise the front legs off the ground.
14. Carefully operate the controls to move the boom and slowly roll yourself in the desired direction. Be certain that the Tires and the new resting places for the Legs all remain on solid, stable ground.



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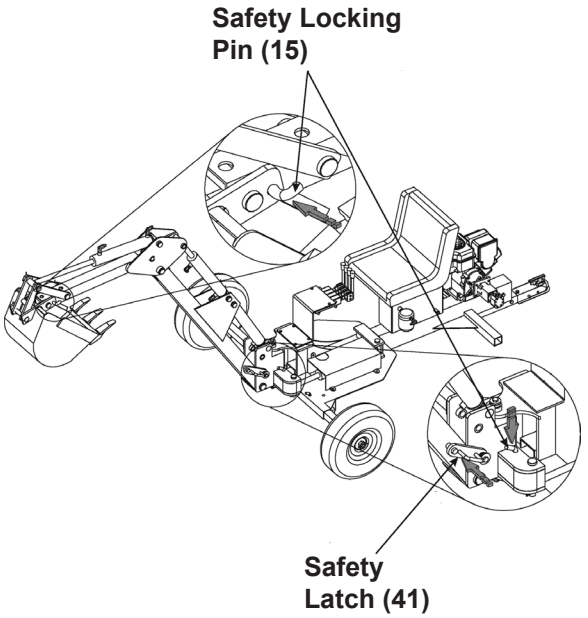
15. After you have repositioned the Trencher, raise the Boom to lower the outriggers back onto the ground. The procedure can be repeated to move farther.

Transporting the Trencher

16. Lock the Boom in Place. Use the Bucket Lever to line the hole on the Bucket (32) up with the hole on the Boom Extension (34). Insert a Safety Locking Pin (15) and secure with a Ball Pin.

17. Use the Boom Swing Lever to line up the hole in the Boom Pivot (38) with the Hole in the Frame (90). Insert a Safety Locking Pin (15) and secure with a Ball Pin.

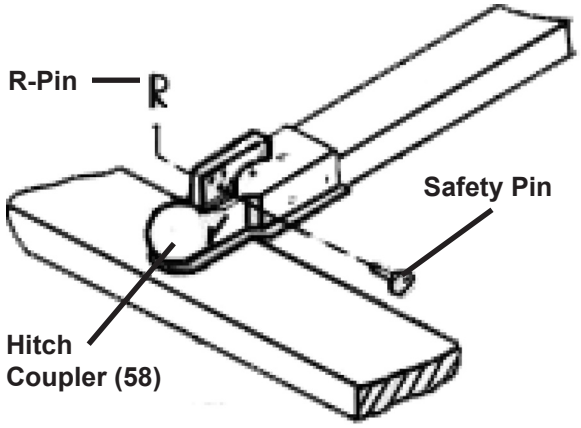


18. Put the Boom into the Shallow Position and raise it until the pin on the side of the Main Boom (36) is close enough for the Safety Latch (41) to swing over it. To use the Safety Latch, pull out on the handle, swing it over the pin, and lower it over the pin, locking it in place.

19. When transporting the Trencher, make sure your hitch (not included) is compatible with the Hitch Coupler (92). Follow all of the safety warnings for towing in your vehicle's manual. The Hitch Coupler will only accept a 2 inch hitch ball.

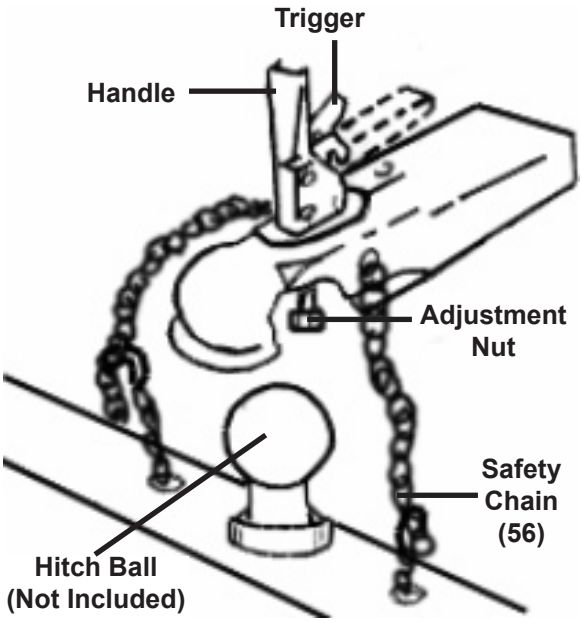
20. To reduce friction between the hitch ball and Hitch Coupler (58), apply a layer of heavy weight grease over the hitch ball.

21. See illustration below. Temporarily remove the "R" Pin and Safety Pin. Then, pull up on the Trigger and lift up on the Handle.



22. Place the Hitch Coupler (58) over the vehicle's hitch ball, pull the trigger, push down on the Handle, and release the Trigger, making sure it locks in the slot. Pull up and down on the Coupler to make sure the hitch ball is fitting snugly in the Coupler. There should be no play between the hitch ball and Coupler. If there is play, tighten the Adjustment Nut until no play is present. If the Adjustment Nut is too tight, the Handle will not lock. **WARNING!** If the Hitch Coupler is not secured properly, the ball could come loose while the Trencher is in motion,

possibly causing property damage or SERIOUS PERSONAL INJURY.



23. Make sure to attach each side of the Safety Chain (56) equally to the towing vehicle's rear bumper or frame.

24. CAUTION! Care must be taken when backing up the Trencher. Only back up the Trencher on a straight path. If the Trencher is allowed to turn off the straight path while backing up, the Trencher could jackknife, causing severe damage to the Trencher and to the towing vehicle.

25. To prevent accidents, turn off the engine, wait for it to cool, and disconnect its spark plug wire after use. Clean external parts with clean cloth, then store the equipment out of children's reach.

TECHNICAL SPECIFICATIONS

Engine Type		Single Cylinder 4 stroke OHV, 9HP Air Cooled, Recoil Start
Battery Required		12V 18Ah
Bore x Stroke		77mm x 58mm
Displacement		270cc
Compression Ratio		8.2:1
Rotation viewed from PTO (power takeoff - the output shaft)		Counterclockwise
Fuel	Type	86+ octane unleaded gasoline
	Capacity	1.58 Gallons
Engine Oil	Type SAE	10W30 above 32° F 5W30 at 32° F or below
	Capacity	1.2 Quarts
Spark Plug	Type	NGK®, BPR7ES LD®, F7TC
	Gap	0.028 - 0.031”
Valve Clearance	Intake	0.15 ± 0.02 mm
	Exhaust	0.20 ± 0.02 mm
Speed	Idle	1,400 ± 150 RPM
	Maximum	3600 RPM

SERVICING

⚠WARNING **Risk of serious personal injury from accidental starting. Turn the Power Switch of the equipment to its “OFF” position, wait for the engine to cool, and unplug the spark plug wire(s) before performing any inspection, maintenance, or cleaning procedures.**

Damaged equipment can fail, causing serious personal injury. Do not use damaged equipment. If abnormal noise, vibration, or excess smoking occurs, have the problem corrected before further use.

Maintenance Procedures

Many maintenance procedures, including any not detailed in this manual, will need to be performed by a qualified technician for safety. If you have any doubts about your ability to safely service the equipment or engine, have a qualified technician service the equipment instead.

Engine Oil Change

⚠CAUTION! Oil is very hot during operation and can cause burns. Wait for engine to cool before changing oil.

1. Place a drain pan (not included) underneath the crankcase’s drain plug.
2. Remove the drain plug and drain the oil out. Recycle used oil.
3. Replace the drain plug and tighten it.
4. Refill the oil to the proper level following the instructions under the Starting the Engine section.

Air Filter Element Maintenance

1. The air cleaner cover is held in place by a wing nut or clamps. Remove it.
2. Remove the air filter element.
3. **Cleaning:**

   a. For “paper” filter elements:
   To prevent injury from dust and debris, wear ANSI-approved safety goggles, NIOSH-approved dust mask/respirator, and heavy-duty work gloves. In a well-ventilated area away from bystanders, use pressurized air to blow dust out of the air filter. If this does not get the filter reasonably clean, replace it.

b. For foam filter elements:
Wash the element in warm water and mild detergent several times. Rinse. Squeeze out excess water and allow it to dry completely. Soak the filter in lightweight oil briefly, then squeeze out the excess oil.

4. Install the new filter or the cleaned filter. Secure the Air Cleaner Cover before use.

Spark Plug Maintenance

1. Disconnect spark plug wire from end of plug. Clean out debris from around spark plug.
2. Using a spark plug wrench, remove the spark plug.
3. Inspect the spark plug:
If the electrode is oily, clean it using a clean, dry rag.
If the electrode has deposits on it, polish it using emery paper.
If the white insulator is cracked or chipped, the spark plug needs to be replaced.
4. When installing a new spark plug, adjust the plug's gap to the specification on the Technical specification chart. Do not pry against the electrode, the spark plug can be damaged.
5. Install the spark plug into the engine.
Gasket-style: Finger-tighten until the gasket contacts the cylinder head, then turn about 1/2-2/3 more.
Non-gasket-style: Finger-tighten until the plug contacts the head, then turn about 1/16 more.
6. Apply dielectric spark plug boot protector (not included) to the end of the spark plug and reattach the wire securely.

Fuel Filter Replacement (if equipped)

⚠WARNING! RISK OF FIRE OR EXPLOSION. Replace the fuel filter in a well-ventilated area away from ignition sources. Do not smoke.

1. Wait for engine to cool before proceeding.
2. Wear protective gear including, ANSI-approved safety goggles, NIOSH-approved dust mask/respirator, and nitrile gloves.
3. Wipe Fuel Cap and top of Fuel Tank.
4. Remove Fuel Filter (6R). Reattach Fuel Cap to prevent debris from entering into Gas Tank.
5. Remove Buel Strainer. Wash with warm water and light detergent. Flush and let dry.
6. Reinstall in the Gas Tank.

Cleaning, Maintenance, and Lubrication Schedule

Note: This maintenance schedule is intended solely as a general guide. If performance decreases or if equipment operates unusually, check systems immediately. The maintenance needs of each piece of equipment will differ depending on factors such as duty cycle, temperature, air quality, fuel quality, and other factors.

Note: These procedures are in addition to the regular checks and maintenance explained as part of the regular

operation of the engine and equipment.

After 20 Operation Hour Break-in Period:

a. Change engine oil.

After Every 25 Operation Hours:

a. Clean/replace air filter element.

b. Inspect/clean spark plug.

c. Blow out water filters.

After Every 50 Operation Hours:

a. Change engine oil.

b. Replace fuel filter (if equipped).

After Every 100 Operation Hours:

a. Replace spark plug.

b. Replace air filter element.

Note: All maintenance procedures scheduled for 25, 50, and 100 operation hours should be performed at least yearly.

After Every 300 Operation Hours:

a. Clean fuel tank and carburetor.

b. Clean carbon build-up from combustion chamber.

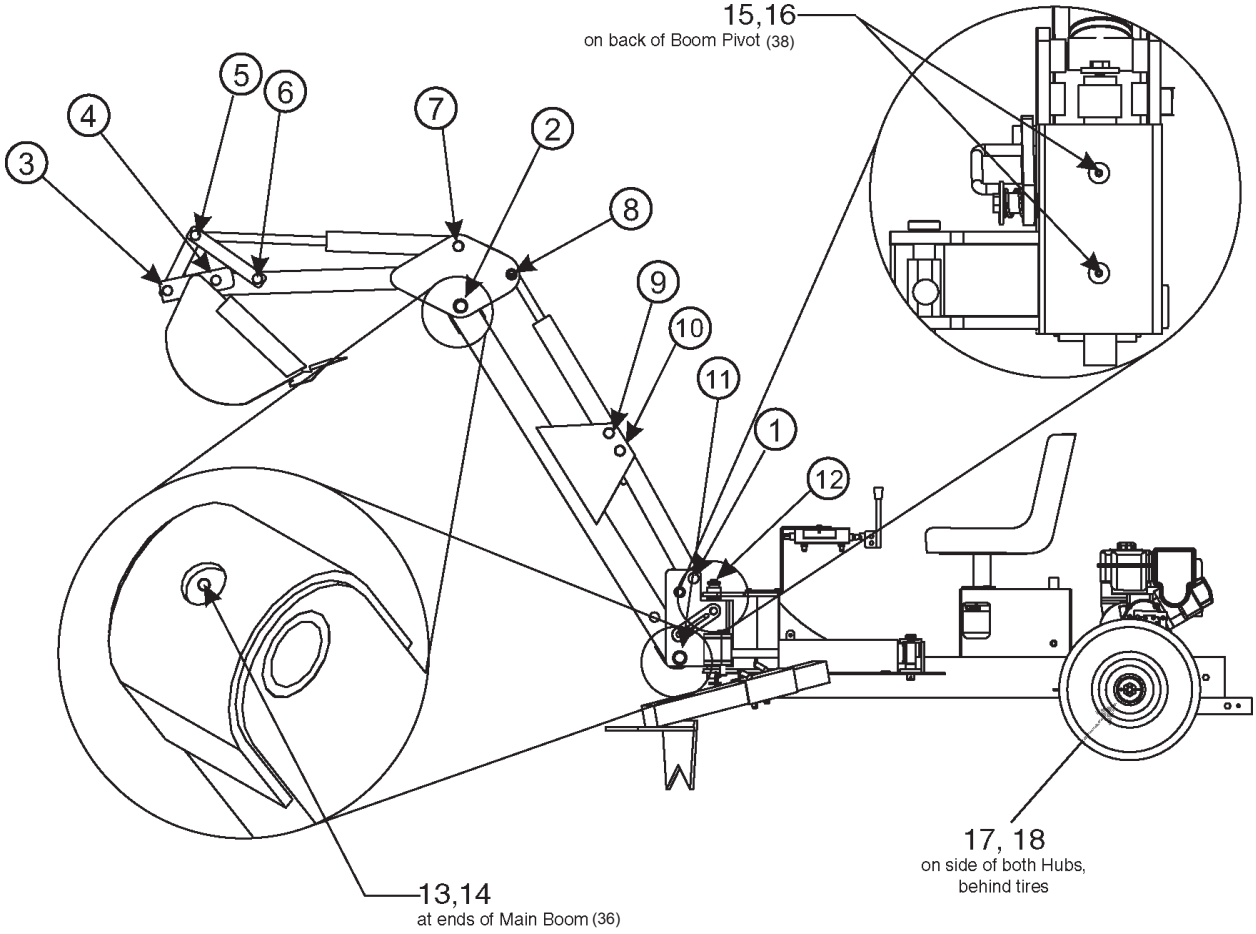
Periodically:

1. Periodically, apply grease to all boom axis-movement points using a grease gun, at the points shown in the illustration on the next page.

Storage

1. Wait for engine to cool, then clean engine with clean cloth.
2. When the equipment is to remain idle for longer than 20 days, prepare the engine for storage as follows:
   a. Change engine oil and empty fuel tank.
   b. Either leave fuel tank empty or refill fuel tank with fresh unleaded gasoline mixed with a fuel stabilizer intended for long term engine storage (not included). After filling, run engine for about 5-10 minutes to circulate the treated gasoline through the carburetor. Wait for engine to cool before proceeding.
   c. Clean out area around spark plug. Remove spark plug and pour one tablespoon of engine oil into cylinder through spark plug hole.
   d. Replace spark plug, but leave spark plug wire disconnected.
   e. Pull recoil starter to distribute oil in cylinder. Pull one full length of Recoil Starter Rope.
   f. Disconnect battery cables (if equipped).
3. Apply a thin coat of rust preventive oil to all metal parts.
4. Cover and store in a dry, well-ventilated area out of reach of children.
5. Before starting the engine after storage, keep in mind that untreated gasoline will deteriorate quickly. Drain the fuel tank and change to fresh fuel if untreated gasoline has been sitting for a month, if treated gasoline has been sitting beyond the fuel stabilizer's recommended time period, or if the engine does not start properly.

Lubrication Points



Troubleshooting

Problem	Possible Causes	Probable Solutions
Engine will not start	FUEL RELATED:	FUEL RELATED:
	1. No fuel in tank or fuel valve closed.	1. Fill fuel tank and open fuel valve.
	2. Choke not in start position, especially with cold engine.	2. Move choke to start position if engine is cold.
	3. Low quality or deteriorated old gasoline.	3. Use only fresh 86+ octane unleaded gasoline.
	4. Carburetor not primed.	4. Prime carburetor by pressing priming bulb (if equipped).
	5. Dirty fuel passageways blocking fuel flow.	5. Clean out passageways using fuel additive. Heavy deposits may require further cleaning.
	6. Carburetor needle stuck. Fuel can be smelled in the air.	6. **Gently** tap side of carburetor float chamber with screwdriver handle.
	7. Too much fuel in chamber. This can be caused by the carburetor needle sticking.	7. Turn Fuel Valve to its off position. Turn choke to run position. Remove spark plug and pull the start handle several times to air out the chamber. Reinstall spark plug and set choke to start position.
	IGNITION (SPARK) RELATED:	IGNITION (SPARK) RELATED:
	1. Spark plug wire not connected securely.	1. Connect spark plug wire properly.
	2. Spark plug electrode wet or dirty.	2. Clean spark plug.
	3. Incorrect spark plug gap.	3. Correct spark plug gap.
	4. Spark plug wire broken.	4. Replace spark plug wire.
	5. Incorrect spark timing or faulty ignition system.	5. Have qualified technician diagnose/ repair ignition system.
	COMPRESSION RELATED:	COMPRESSION RELATED:
	1. Cylinder not lubricated. Problem after long storage periods.	1. Pour tablespoon of oil into spark plug hole. Crank engine a few times and try to start again.
	2. Loose or broken spark plug. (Hissing noise will occur when trying to start.)	2. Tighten spark plug. If that does not work, replace spark plug. If problem persists, may have head gasket problem, see #3.
	3. Loose cylinder head or damaged head gasket. (Hissing noise will occur when trying to start.)	3. Tighten head. If that does not remedy problem, replace head gasket.
	4. Engine valves or tappets misadjusted or stuck.	4. Adjust valve clearance. If that does not work, clean or replace valves/ tappets.

Follow all safety precautions whenever diagnosing or servicing the equipment or engine.

Troubleshooting

Problem	Possible Causes	Probable Solutions
Trencher loses performance	1. Mushy hydraulic operation. 2. Oil Leaks.	1. Bleed hydraulic system. Replace hydraulic filter/celan strainer. 2. Tighten/replace hose.
Engine misfires	1. Spark plug wire loose. 2. Incorrect spark plug gap or damaged spark plug. 3. Defective spark plug wire. 4. Old or low quality gasoline. 5. Incorrect compression.	1. Check wire connections. 2. Re-gap or replace spark plug. 3. Replace spark plug wire. 4. Use only fresh 86+ octane unleaded gasoline. 5. Diagnose and repair compression.
Engine stops suddenly	1. Low oil shutdown. 2. Fuel tank empty or full of impure or low quality gasoline. 3. Defective fuel tank cap creating vacuum, preventing proper fuel flow. 4. Faulty magneto.	1. Fill engine oil to proper level. Check engine oil before EVERY use. 2. Fill fuel tank with fresh 86+ octane unleaded gasoline. 3. Test/replace fuel tank cap. 4. Have qualified technician service magneto.
Engine knocks	1. Old or low quality gasoline. 2. Engine overloaded. 3. Incorrect spark timing, deposit buildup, worn engine, or other mechanical problems.	1. Fill fuel tank with fresh 86+ octane unleaded gasoline. 2. Do not exceed equipment's load rating. 3. Have qualified technician diagnose and service engine.
Engine backfires	1. Impure or low quality gasoline. 2. Engine too cold. 3. Intake valve stuck or overheated engine.	1. Fill fuel tank with fresh 86+ octane unleaded gasoline. 2. Use cold weather fuel and oil additives to prevent backfiring. 3. Have qualified technician diagnose and service engine.

Follow all safety precautions whenever diagnosing or servicing the equipment or engine.

PLEASE READ THE FOLLOWING CAREFULLY

THE MANUFACTURER AND/OR DISTRIBUTOR HAS PROVIDED THE PARTS LIST AND ASSEMBLY DIAGRAM IN THIS MANUAL AS A REFERENCE TOOL ONLY. NEITHER THE MANUFACTURER OR DISTRIBUTOR MAKES ANY REPRESENTATION OR WARRANTY OF ANY KIND TO THE BUYER THAT HE OR SHE IS QUALIFIED TO MAKE ANY REPAIRS TO THE PRODUCT, OR THAT HE OR SHE IS QUALIFIED TO REPLACE ANY PARTS OF THE PRODUCT. IN FACT, THE MANUFACTURER AND/OR DISTRIBUTOR EXPRESSLY STATES THAT ALL REPAIRS AND PARTS REPLACEMENTS SHOULD BE UNDERTAKEN BY CERTIFIED AND LICENSED TECHNICIANS, AND NOT BY THE BUYER. THE BUYER ASSUMES ALL RISK AND LIABILITY ARISING OUT OF HIS OR HER REPAIRS TO THE ORIGINAL PRODUCT OR REPLACEMENT PARTS THERETO, OR ARISING OUT OF HIS OR HER INSTALLATION OF REPLACEMENT PARTS THERETO.

PARTS LIST

PART #	DESCRIPTION	Q'TY
1	NUT 3/8 "	4
2	SPRING WASHER 3/8 "	10
3	CONTROL SUPPORT	1
4	WASHER 3/8 "	9
5	HEXHD.BOLT 3/8*1-1/8" "	8
6	SCUTCHEON	1
7	HOSE ASSEMBLY NO.6	1
8	HEX CONNECTOR	10
9	CONTROL VALVE	1
10	SEAT BOTTOM	1
11	FILL PLUG/DIPSTICK	1
12	SPRING WASHER 5/16 "	17
13	ENTER HOSE ASSEMBLY NO.1	1
14	HEX BOLT 3/8"*1"	2
15	SAFETY LOCKING PIN	2
16	SPRING HAIR PIN CLIP	8
17	HOSE ASSEMBLY NO.4	1
18	HOSE ASSEMBLY NO.9	1
19	EXTENSION LEG(RIGHT)	1
20	LOCK PIN NO.1	4
21	HOSE ASSEMBLY NO.5	1
22	HOSE ASSEMBLY NO.10	1
23	CONTROL PANEL	1
24	LEG ASSEMBLY	2
25	90 ELBOW FITTING NO.1	8
26	CYLINDER	4
27	CONNECTING ROD	2
28	CONNECTING ROD	2
29	CLEVIS PIN NO.1	8
30	BUSHING	1
31	HAIR PIN CLIP 3/16"*2-5/16"	15
32	BUCKET ASSEMBLY	1
33	LUBRICATION FITTING	11
34	BOOM EXTENSION	1
35	CLEVIS PIN NO.2	2
36	MAIN BOOM	1
37	LUBRICATION FITTING	6
38	BOOM PIVOT	1
39	HOSE ASSEMBLY NO.3	1
40	HOSE ASSEMBLY NO.8	1
41	SAFETY LATCH	1
42	PIN	2
43	SPRING	1
44	WASHER 15/16 “	1
45	EXTENSION LEG (LEFT)	1
46A	HOSE ASSEMBLY NO.2	2
47	HEX NUT5/16 “	5
48	HEX HD.BOLT 5/16”*3/4”	3
49	COVER	1
50	AXLE& HUB ASSEMBLY	2

PART #	DESCRIPTION	Q'TY
51	HAIR PIN CLIP 1/8*1-3/4” “	2
52	TIRE	2
53	LUG NUT	2
54	OUTLET HOSE	1
55	HOSE CLAMP	2
56	SAFETY CHAIN	1
57	HEXNUT 3/8”	3
58	HITCH COUPLER	1
59	NUT ½	1
60	HEX HD.BOLT 3/8*2-3/4” “	2
61	HEX HD.BOLT3/8*3-1/2” “	1
62	HEX HD.BOLT5/16*1” “	2
63	WASHER	6
64	90 ELBOW FITTING NO.4	1
65	HYDRAULIC PUMP	1
66	90 DEG. ELBOW FITTING NO.3	1
67	PUMP KEY	1
68	COUPING-PUMP SIDE	1
69	HEX SCREW	2
70	MOUNTING BRACKET - PUMP	1
71	ENGINE KEY	1
72	HEX HD.BOLT 5/16*1-3/4””	4
73	SEAT	1
74	ENGINE	1
75	HEX HD.BOLT 5/16”	4
76	COUPING-ENGINE SIDE	1
77	HAIR PIN CLIP	1
78	WHEEL	1
79	LOCK PIN	1
80	WEIGHT BLOCK	1
81	HEX HD.BOLT 5/8”*4-3/4”	1
82	LOCK PIN NO.2	2
83	WASHER 5/8	1
84	NUT 5/8 “	1
85	90 ELBOW FITTING NO.2	1
86	HEX HD.BOLT 5/16”*1-1/8”	4
87	“O” RING SEAL	1
88	OIL FILTER	1
89	OIL PLUG R3/8 “	1
90	FRAME ASSEMBLY	1
91	CLEVIS PIN NO.3	1
92	WASHER	2
93	PIVOT PIN	1
94	BUSHING	1
95	SNAP SPRING	1
96	SPRING WASHER 1/4”	2
97	HEXHD.BOLT 1/4”*1/2”	2
98	SPRING HAIR PIN CLIP	1
99	SPIDER	1

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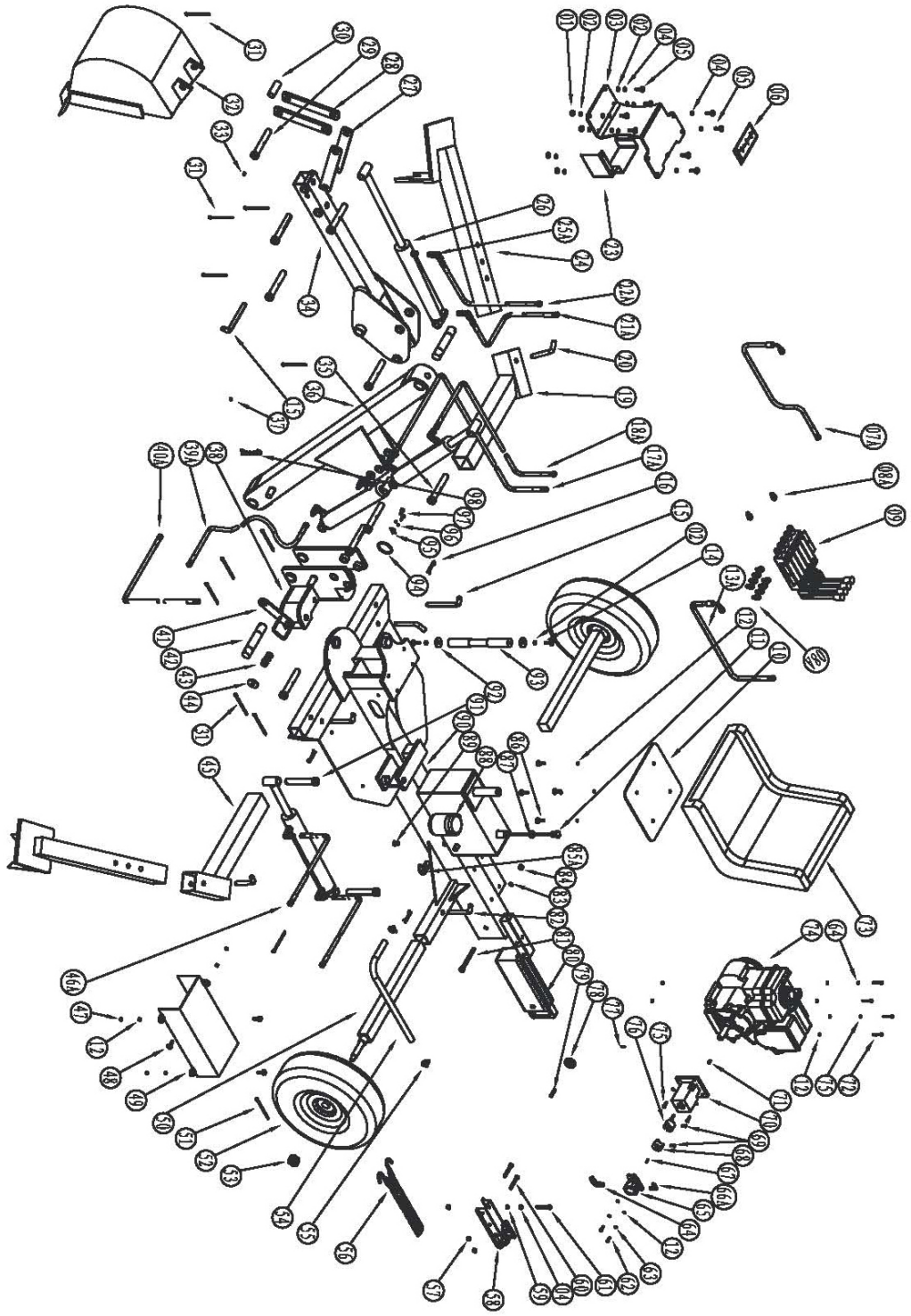
GENERAL ASSEMBLY DIAGRAM



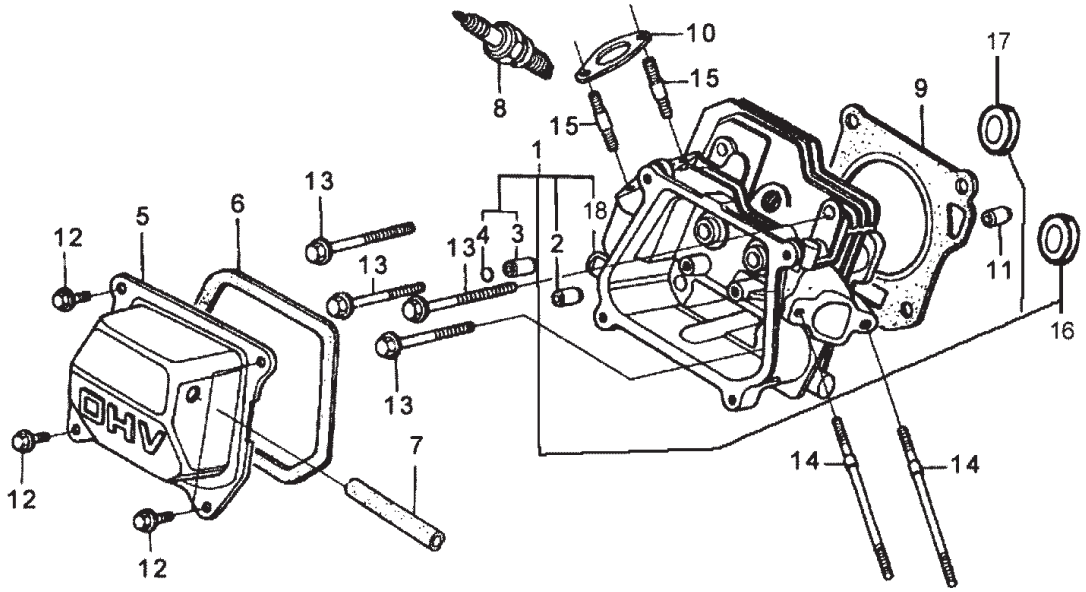
Record Product's Serial Number Here:_____

Note: If product has no serial number, record month and year of purchase instead.

Note: Some parts are listed and shown for illustration purposes only, and are not available individually as replacement parts.

CYLINDER HEAD PARTS LIST & DIAGRAM

Part #	Description	Qty
1B	Cylinder Head Assembly	1
2B	Intake Valve Guide	1
3B	Exhaust Valve Guide	1
4B	Valve Guide Clip	1
5B	Cover	1
6B	Packing	1
7B	Breathing Tube	1
8B	Spark Plug	1
9B	Cylinder Gasket	1
10B	Muffler Gasket	1
11B	Pin	2
12B	Bolt 6x14	4
13B	Bolt 8x55	4
14B	Intake Bolt	2
15B	Exhaust Bolt	2
16B	Intake Valve Seat	1
17B	Exhaust Valve Seat	1
18B	Cylinder Head	1



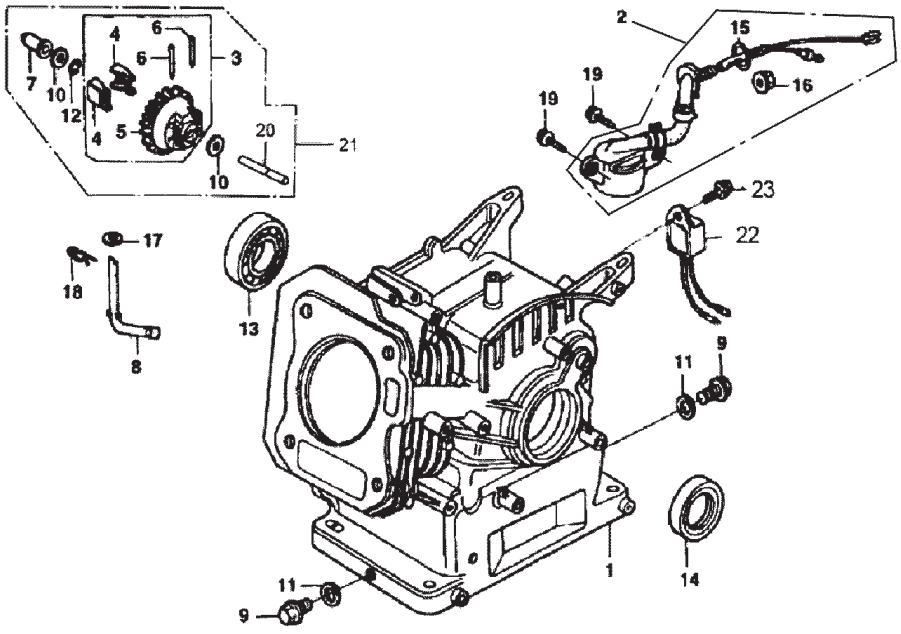
Note: When ordering replacement parts from this diagram, the “B” suffix must be included in order to get the correct part.

Note: Some parts are listed and shown for illustration purposes only, and are not available individually as replacement parts.

CRANK CASE PARTS LIST & DIAGRAM

Part #	Description	Qty
1C	Crank Case Assembly	1
2C	Oil Level Switch	1
3C	Governor Gear Assembly	1
4C	Weight	2
5C	Governor Gear	1
6C	Weight Pin	2
7C	Slider	1
8C	Shaft Arm	1
9C	Drain Plug	2
10C	Washer	2
11C	Washer	2
12C	Clip	1

Part #	Description	Qty
13C	Ball Bearing	1
14C	Oil Seal	1
15C	O-ring	1
16C	Nut	1
17C	Washer	1
18C	R-pin	1
19C	Bolt 6x12	3
20C	Shaft	1
21C	Governor Assembly	1
22C	Oil Alarm	1
23C	Bolt	1

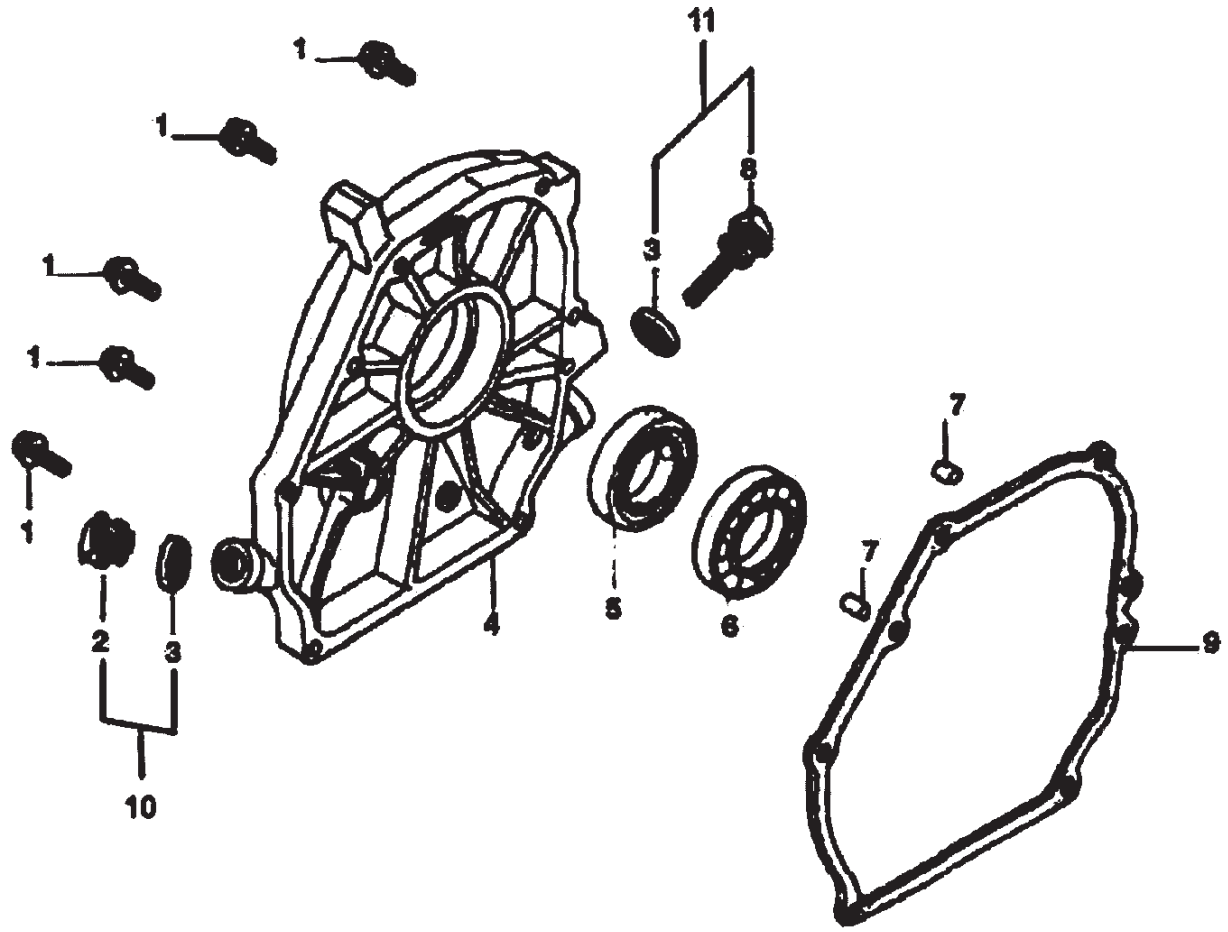


Note: When ordering replacement parts from this diagram, the “C” suffix must be included in order to get the correct part.

Note: Some parts are listed and shown for illustration purposes only, and are not available individually as replacement parts.

CRANK CASE COVER PARTS LIST AND DIAGRAM

Part #	Description	Qty
1D	Bolt	6
2D	Oil Stick	1
3D	Gasket	2
4D	Cover	1
5D	Oil Seal	1
6D	Bearing	1
7D	Pin	2
8D	Oil Filler Cap	1
9D	Gasket Case Cover	1
10D	Oil Fill Assembly	1
11D	Cap Assembly	1

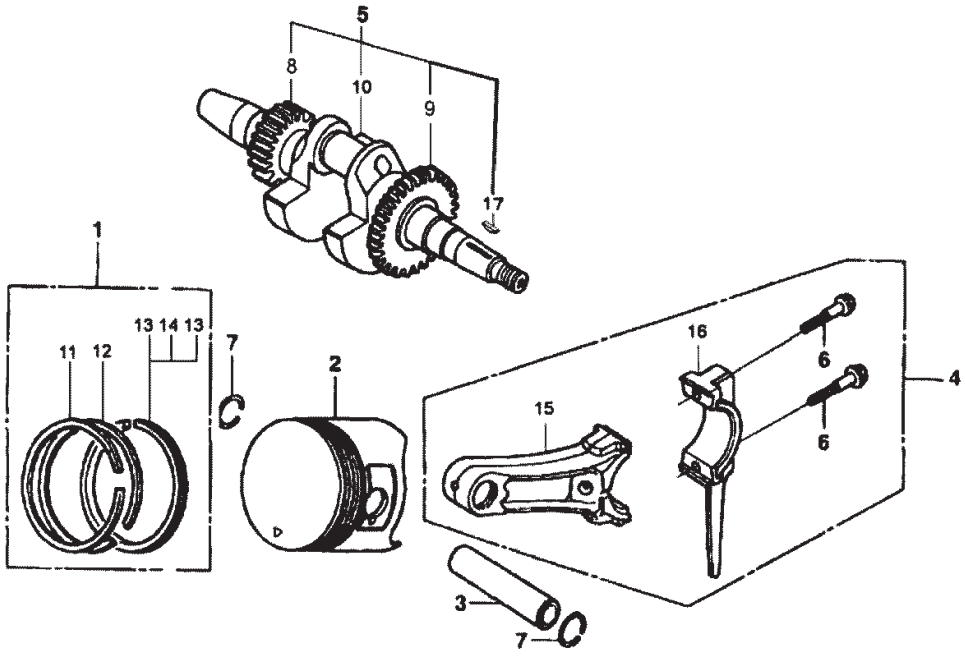


Note: When ordering replacement parts from this diagram, use the suffix “D”.

Note: Some parts are listed and shown for illustration purposes only, and are not available individually as replacement parts.

CRANKSHAFT/PISTON PARTS LIST & DIAGRAM

Part #	Description	Qty
1E	Ring Set	1
2E	Piston	1
3E	Pin	1
4E	Rod Assembly	1
5E	Crankshaft Assembly	1
6E	Bolt	2
7E	Clip	2
8E	Timing Gear	1
9E	Gear	1
10E	Crankshaft	1
11E	First Ring	1
12E	Second Ring	1
13E	Oil Ring	2
14E	Bushing Ring	1
15E	Connecting Rod	1
16E	Connecting Rod Bearing Cap	1
17E	Key	1



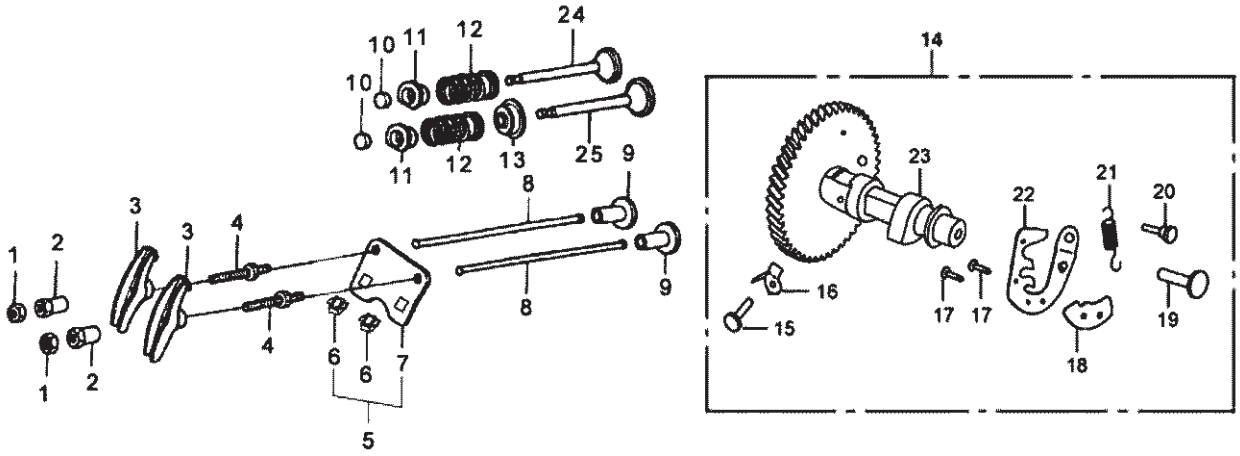
Note: When ordering replacement parts from this diagram, use the suffix “E”.

Note: Some parts are listed and shown for illustration purposes only, and are not available individually as replacement parts.

GAS DISTRIBUTION ADJUSTMENT SYSTEM PARTS LIST & DIAGRAM

Part #	Description	Qty
1F	Nut	2
2F	Rocker Arm	2
3F	Valve Rocker	2
4F	Pivot Bolt	2
5F	Plate Assembly	1
6F	Block Guide	2
7F	Push Rod Guide	1
8F	Push Rod	2
9F	Valve Lifter	2
10F	Valve Cap	2
11F	Valve Spring Retainer	2
12F	Valve Spring	2
13F	Guide Seal	1

Part #	Description	Qty
14F	Camshaft Assembly	1
15F	Reducer Pin	1
16F	Reducer	1
17F	Matching Block Pin	2
18F	Matching Block	1
19F	Flying Block Pin	1
20F	Spring Pin	1
21F	Flying Block Spring	1
22F	Flying Block	1
23F	Camshaft	1
24F	Exhaust Valve	1
25F	Intake Valve	1

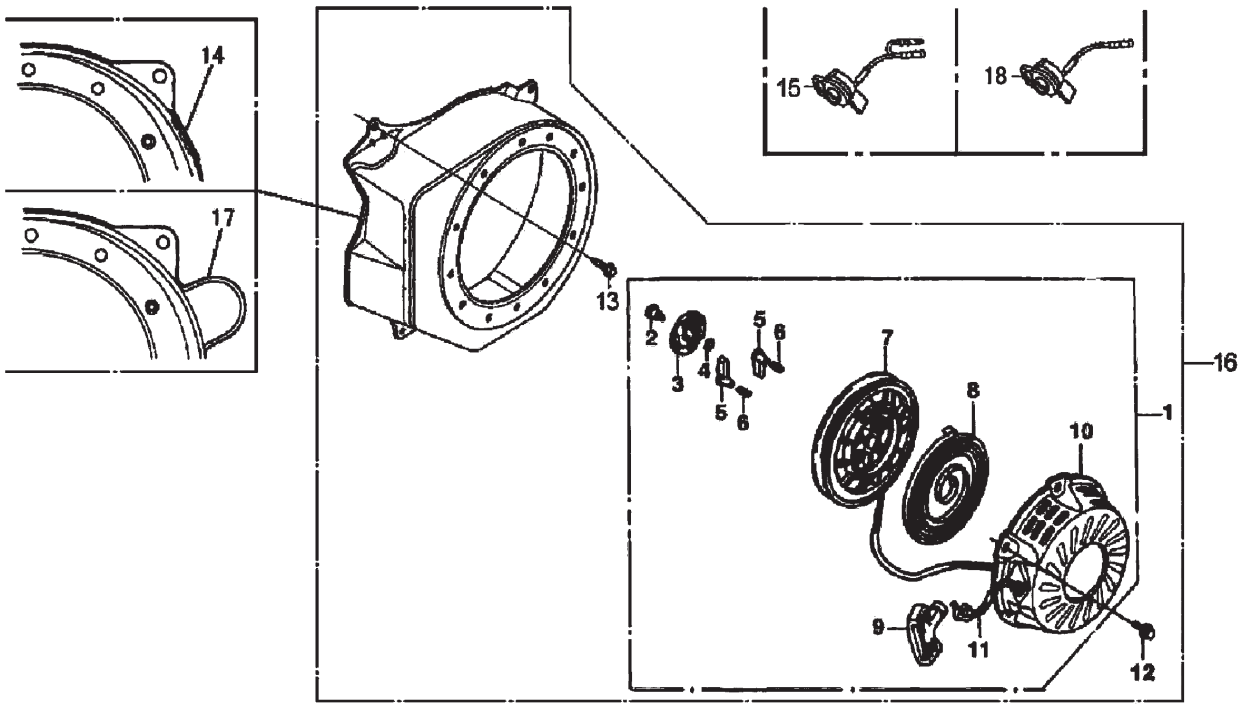


Note: When ordering replacement parts from this diagram, use the suffix “F”.

Note: Some parts are listed and shown for illustration purposes only, and are not available individually as replacement parts.

STARTER SUBASSEMBLY PARTS LIST & DIAGRAM

Part #	Description	Qty
1G	Starter Assembly	1
2G	Set Screw	1
3G	Ratchet Guide	1
4G	Friction Spring	1
5G	Starter Ratchet	2
6G	Return Spring	2
7G	Recoil Starter Reel	1
8G	Recoil Starter Spring	1
9G	Recoil Starter Knob	1
10G	Fan Cover	1
11G	Rope	1
12G	Bolt 6x8	3
13G	Bolt 6x10	4
14G	Fan Cover	1
15G	Switch Assembly	1
16G	Recoil Starter	1
17G	Fan Cover	1
18G	Stop Switch Assembly	1

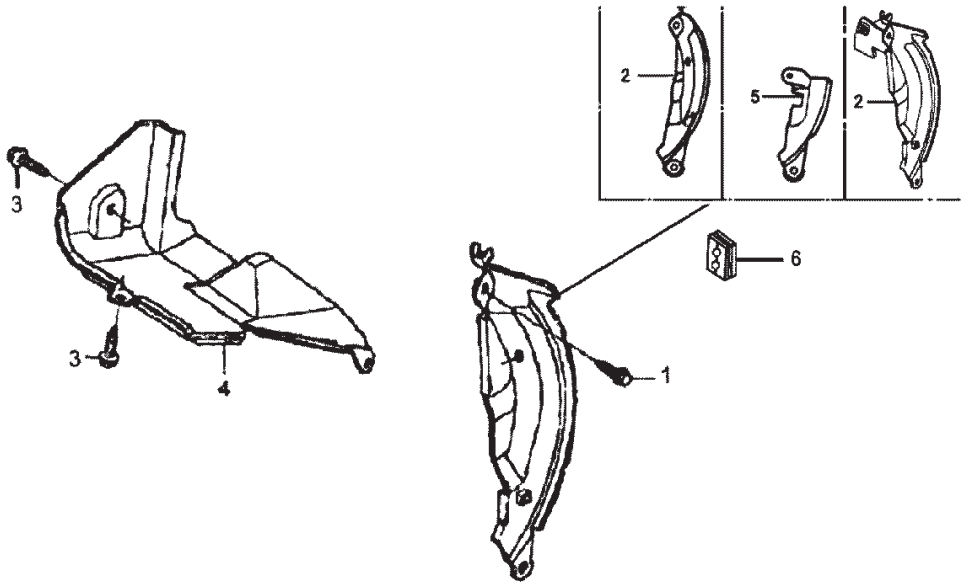


Note: When ordering replacement parts from this diagram, use the suffix “G”.

Note: Some parts are listed and shown for illustration purposes only, and are not available individually as replacement parts.

DIVERSION ASSEMBLY PARTS LIST & DIAGRAM

Part #	Description	Qty
1H	Bolt 6x20	1
2H	Side Plate	1
3H	Bolt 6x8	2
4H	Shroud	1
5H	Side Plate	1
6H	Grommet	1



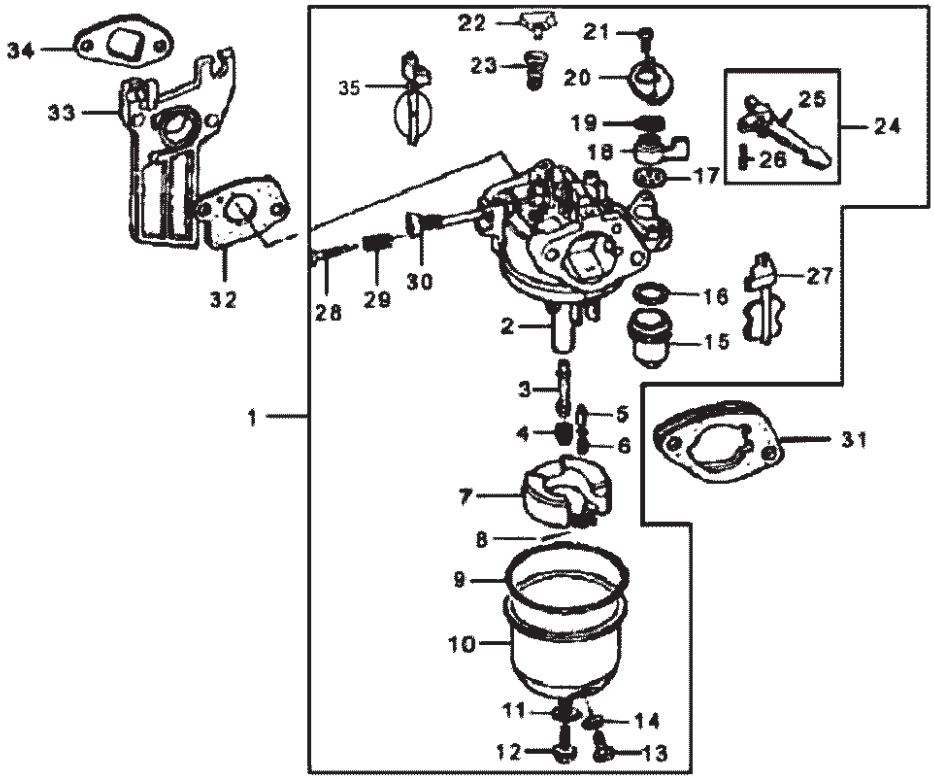
Note: When ordering replacement parts from this diagram, use the suffix “H”.

Note: Some parts are listed and shown for illustration purposes only, and are not available individually as replacement parts.

CARBURETOR PARTS LIST & DIAGRAM

Part #	Description	Qty
1J	Carburetor Assembly	1
2J	Carburetor	1
3J	Main Nozzle	1
4J	Main Jet	1
5J	Float Valve	1
6J	Valve Set Spring	1
7J	Float	1
8J	Float Pin	1
9J	Oil Cup Gasket	1
10J	Oil Cup	1
11J	Gasket Bolt	1
12J	Bolt	1
13J	Drain Bolt	1
14J	Drain Bolt Gasket	1
15J	Fuel Strainer Cup	1
16J	Fuel Strainer Cup Packing	1
17J	Fuel Packing	1
18J	Lever	1

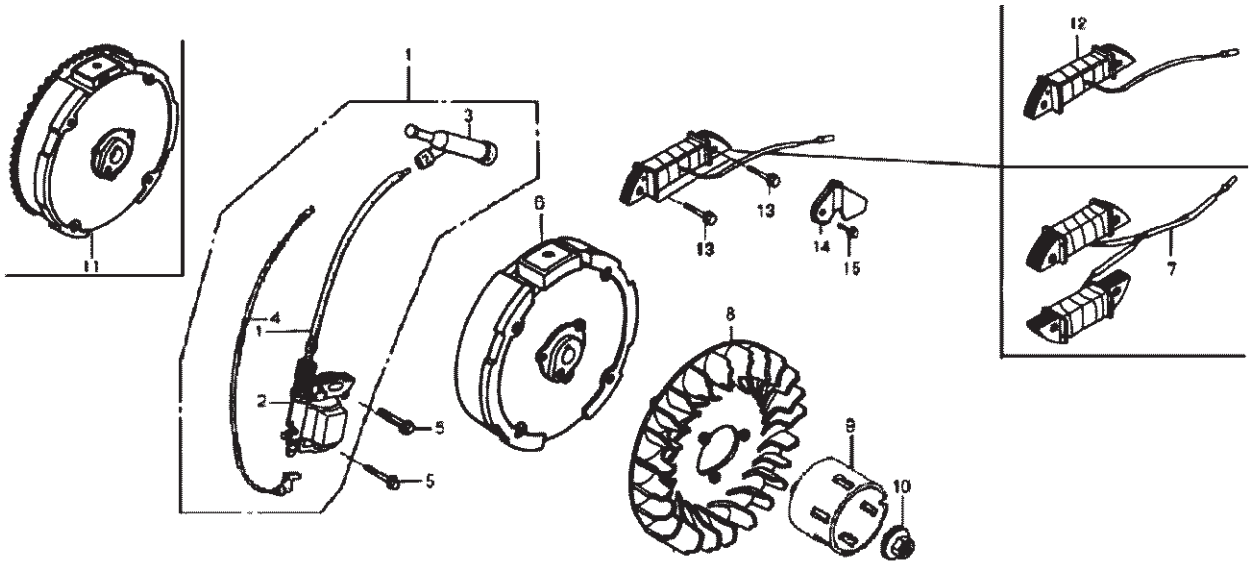
Part #	Description	Qty
19J	Lever Spring	1
20J	Setting Plate	1
21J	Screw 3x8	2
22J	Jet Set	1
23J	Pilot Jet Set	1
24J	Choke Lever Assembly	1
25J	Choke Lever	1
26J	Choke Lever Pin	1
27J	Choke Set	1
28J	Screw	1
29J	Screw Spring	1
30J	Throttle Stop Screw	1
31J	Packing	1
32J	Carburetor Packing	1
33J	Carburetor Insulation	1
34J	Packing	1
35J	Throttle Valve	1



Note: When ordering replacement parts from this diagram, use the suffix “J”.

FLYWHEEL/COIL ASSEMBLY PARTS LIST & DIAGRAM

Part #	Description	Qty
1K	Ignition Assembly	1
2K	Ignition Coil	2
3K	Noise Suppression Cap Assembly	1
4K	Stop Switch Cord	1
5K	Bolt 6x30	2
6K	Flywheel Cover	1
7K	Charge Coil Assembly	1
8K	Cooling Fan	1
9K	Starter Pulley	1
10K	Nut	1
11K	Flywheel	1
12K	Charge Coil	1
13K	Bolt 6x35	2
14K	Cord Clamp	1
15K	Bolt 6x8	1



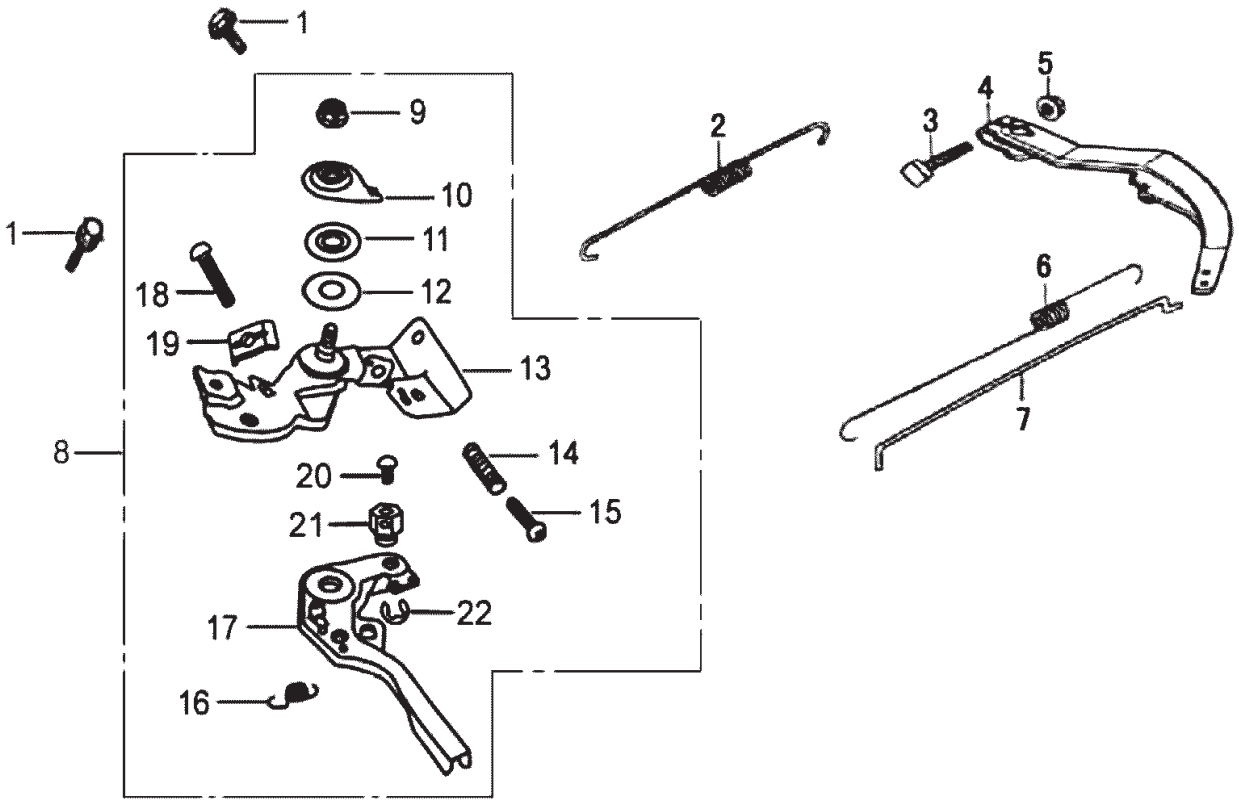
Note: When ordering replacement parts from this diagram, use the suffix “K”.

Note: Some parts are listed and shown for illustration purposes only, and are not available individually as replacement parts.

CONTROL SYSTEM PARTS LIST & DIAGRAM

Part #	Description	Qty
1M	Bolt	2
2M	Governor Spring	1
3M	Bolt	1
4M	Governor Arm	1
5M	Nut	1
6M	Throttle Return Spring	1
7M	Linkage	1
8M	Control Assembly	1
9M	Nut	1
10M	Fixing Plate	1
11M	Washer	1

Part #	Description	Qty
12M	Washer	1
13M	Retainer Assembly	1
14M	Spring	1
15M	Screw 5x35	
16M	Cable Return Spring	1
17M	Control Handle	1
18M	Screw 5x25	1
19M	Back Plate	1
20M	Screw 4x6	1
21M	Locking Ring	1
22M	Clip	1



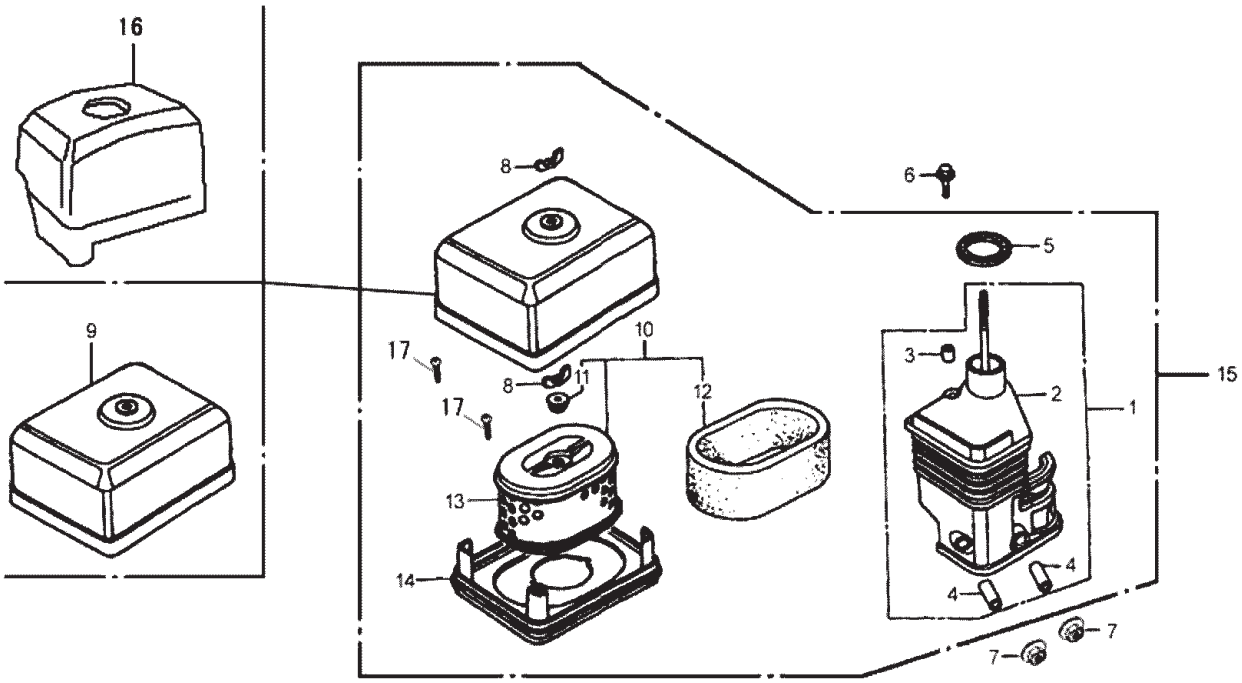
Note: When ordering replacement parts from this diagram, use the suffix “M”.

Note: Some parts are listed and shown for illustration purposes only, and are not available individually as replacement parts.

AIR CLEANER PARTS LIST & DIAGRAM

Part #	Description	Qty
1N	Air Cleaner Assembly	1
2N	Elbow	1
3N	Short Collar	2
4N	Long Collar	2
5N	Elbow Packing	1
6N	Bolt 6x20	1
7N	Nut 6mm	2
8N	Nut	2
9N	Air Cleaner Cover	1

Part #	Description	Qty
10N	Air Cleaner Element Assembly	1
11N	Grommet	1
12N	Outer Filter	1
13N	Element	1
14N	Base	1
15N	Air Cleaner Assembly	1
16N	Cover	1
17N	Screw	2

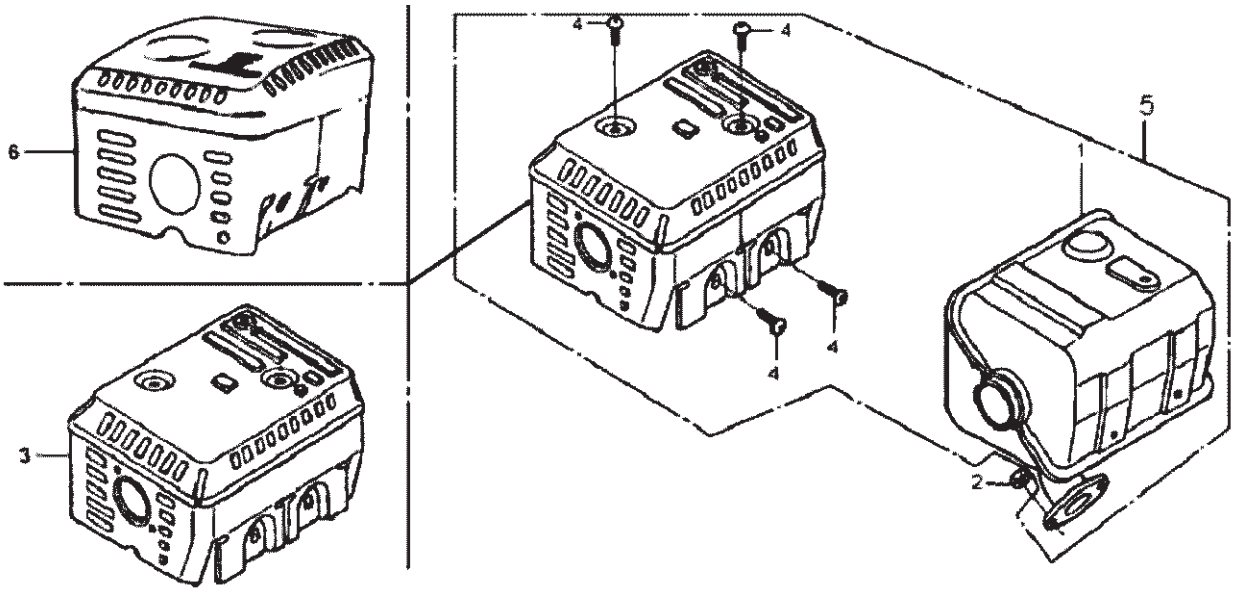


Note: When ordering replacement parts from this diagram, use the suffix “N”.

Note: Some parts are listed and shown for illustration purposes only, and are not available individually as replacement parts.

MUFFLER PARTS LIST & DIAGRAM

Part #	Description	Qty
1P	Muffler	1
2P	Nut 8mm	1
3P	Muffler Cover	1
4P	Screw 5x8	4
5P	Muffler Assembly	1
6P	Muffler Case	1

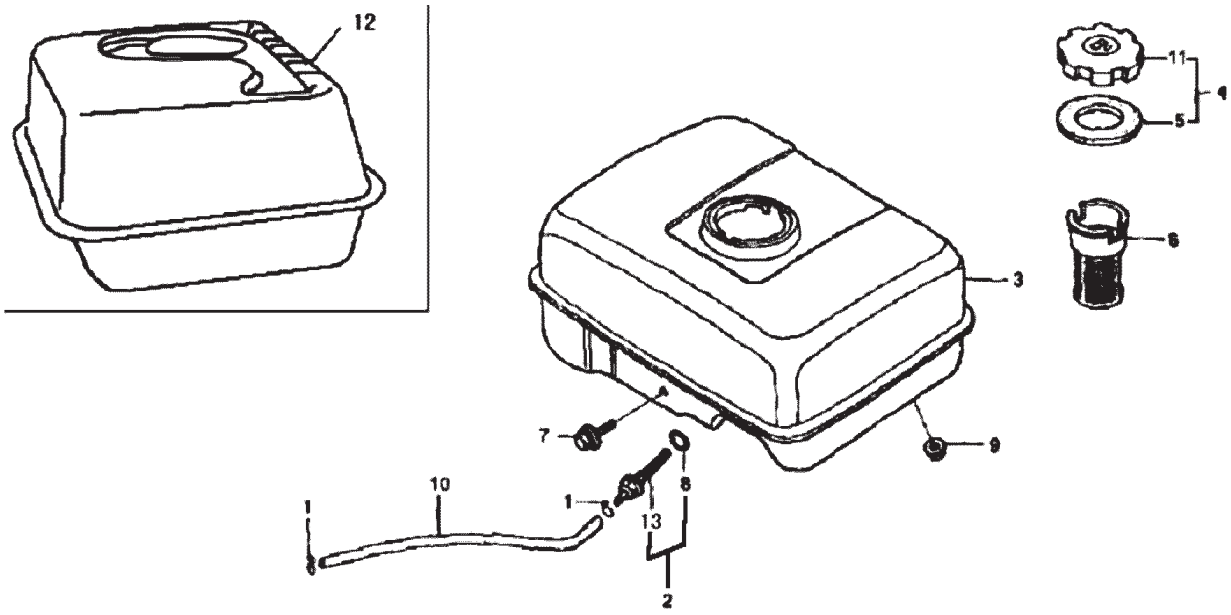


Note: When ordering replacement parts from this diagram, use the suffix “P”.

Note: Some parts are listed and shown for illustration purposes only, and are not available individually as replacement parts.

FUEL TANK PARTS LIST & DIAGRAM

Part #	Description	Qty
1R	Clip Tube	2
2R	Joint Assembly	1
3R	Fuel Tank	1
4R	Fuel Filler Assembly	1
5R	Fuel Cap Gasket	1
6R	Fuel Strainer	1
7R	Bolt 6x25	1
8R	Joint Packing	1
9R	Nut 6mm	2
10R	Fuel Line	1
11R	Fuel Cap	1
12R	Fuel Tank Assembly	1
13R	Adapter/Connector	1



Note: When ordering replacement parts from this diagram, use the suffix “R”.

Note: Some parts are listed and shown for illustration purposes only, and are not available individually as replacement parts.

LIMITED 1 YEAR / 90 DAY WARRANTY

Harbor Freight Tools Co. makes every effort to assure that its products meet high quality and durability standards, and warrants to the original purchaser that for a period of ninety days from date of purchase that the engine/motor, the belts (if so equipped), and the blades (if so equipped) are free of defects in materials and workmanship. Harbor Freight Tools also warrants to the original purchaser, for a period of one year from date of purchase, that all other parts and components of the product are free from defects in materials and workmanship (90 days if used by a professional contractor or if used as rental equipment). This warranty does not apply to damage due directly or indirectly, to misuse, abuse, negligence or accidents, repairs or alterations outside our facilities, normal wear and tear, or to lack of maintenance. We shall in no event be liable for death, injuries to persons or property, or for incidental, contingent, special or consequential damages arising from the use of our product. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation of exclusion may not apply to you. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

To take advantage of this warranty, the product or part must be returned to us with transportation charges prepaid. Proof of purchase date and an explanation of the complaint must accompany the merchandise. If our inspection verifies the defect, we will either repair or replace the product at our election or we may elect to refund the purchase price if we cannot readily and quickly provide you with a replacement. We will return repaired products at our expense, but if we determine there is no defect, or that the defect resulted from causes not within the scope of our warranty, then you must bear the cost of returning the product.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

3491 Mission Oaks Blvd. • PO Box 6009 • Camarillo, CA 93011 • (800) 444-3353

EMISSION CONTROL SYSTEM WARRANTY

California and United States Emission Control Defects Warranty Statement

The California Air Resources Board (herein CARB), the United States Environmental Protection Agency (herein EPA), and Harbor Freight Tools (herein HFT) are pleased to explain the emission control system warranty on your 1995 and later Small Off-Road Engine (herein engine). In California, the engine must be designed, built and equipped to meet the State's stringent anti-smog standards. Elsewhere within the United States, new off-road, spark-ignition engines certified for model year 1997 and later, must meet similar standards set forth by the EPA. HFT must warrant the emission control system on your engine for the periods of time described below, provided there has been no abuse, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the carburetor or fuel-injection system, and the ignition system. Also included may be hoses, belts, connectors and other emission-related assemblies.

Where a warrantable condition exists, HFT will repair your engine at no cost to you including diagnosis, parts and labor.

Manufacturer's Warranty Coverage

The 1995 and later engines are warranted for two (2) years. If any emission-related part on your engine is defective, the part will be repaired or replaced by HFT.

Harbor Freight Tools Emission Control Defects Warranty Coverage

Engines are warranted for a period of two (2) years relative to emission control parts defects, subject to the provisions set forth below. If any emission related part on your engine is defective, the part will be repaired or replaced by HFT.

Owner's Warranty Responsibilities

- As the engine owner, you are responsible for the performance of the required maintenance listed in your Owner's Manual. HFT recommends that you retain all receipts covering maintenance on your engine, but HFT cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.
- As the engine owner, you should, however, be aware that HFT may deny you warranty coverage if your engine or a part has failed due to abuse, neglect, improper maintenance, or unapproved modifications.
- You are responsible for shipping your engine to a HFT warranty station as soon as a problem exists. Contact the HFT Customer Service department at the number below to make shipping arrangements. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days.

If you have any questions regarding your warranty rights and responsibilities, you should contact the Harbor Freight Tools Customer Service Department at 1-800-444-3353.

Harbor Freight Tools Emission Control Defects Warranty Provisions

1. Length of Coverage

HFT warrants to a first retail purchaser and each subsequent purchaser that the engine is free from defects in materials and workmanship that cause the failure of warranted parts for a period of two (2) years after the date of delivery to the first retail purchaser.

2. No Charge Repair or Replacement

Repair or replacement of any warranted part will be performed at no charge to the owner if the work is performed through a warranty station authorized by HFT. For emissions warranty service, contact the HFT Customer Service Department at 1-800-444-3353.

3. Consequential Damages Coverage

Coverage under this warranty shall also extend to the failure of any engine components caused by the failure of any warranted part while it is still covered under this warranty.

4. Coverage Exclusions

Warranty claims shall be filed in accordance with the provisions of the HFT warranty policy explained in the box at the top of the previous page. HFT shall not be liable for any loss of use of the engine, for any alternative usage, for any damage to goods, loss of time, or inconvenience. Warranty coverage shall also be excluded for any part which fails, malfunctions, or is damaged due to failure to follow the maintenance and operating instructions set forth in the Owner's Manual including, but not limited to:

a) Use of parts which are not authorized by HFT

b) Improper installation, adjustment or repair of the engine or of any warranted part unless performed by an authorized warranty center

c) Failure to follow recommendations on fuel use contained in the Owner's Manual

d) Improper or inadequate maintenance of any warranted parts

e) Repairs performed outside of the authorized warranty service dealers

f) Alterations by changing, adding to or removing parts from the engine.

5. Service and Maintenance

Component parts which are not scheduled for replacement as required maintenance or are scheduled only for regular inspection to the effect of "repair or replace as necessary" are warranted for the warranty period. Any warranted part which is scheduled for replacement as required maintenance is warranted for the period of time up to the first scheduled replacement point for that part. Any replacement part, provided it is equivalent in durability and performance, may be used in performance of maintenance or repairs. The owner is responsible for commissioning a qualified technician/mechanic to perform all required maintenance, as outlined in the Inspection, Cleaning, and Maintenance section in this manual.

6. Warranted Parts

1) Fuel Metering System

i) Carburetor and its internal parts.

ii) Fuel pump (if so equipped).

iii) Cold start enrichment system.

2) Air Induction System

i) Intake pipe/manifold.

ii) Air cleaner.

3) Ignition System

i) Spark plug.

ii) Magneto ignition system.

4) Catalyst System (if so equipped)

i) Exhaust pipe stud.

ii) Muffler.

iii) Catalytic converter (if so equipped).

5) Miscellaneous Items Used in Above Systems

i) Vacuum, temperature and time sensitive valves and switches.

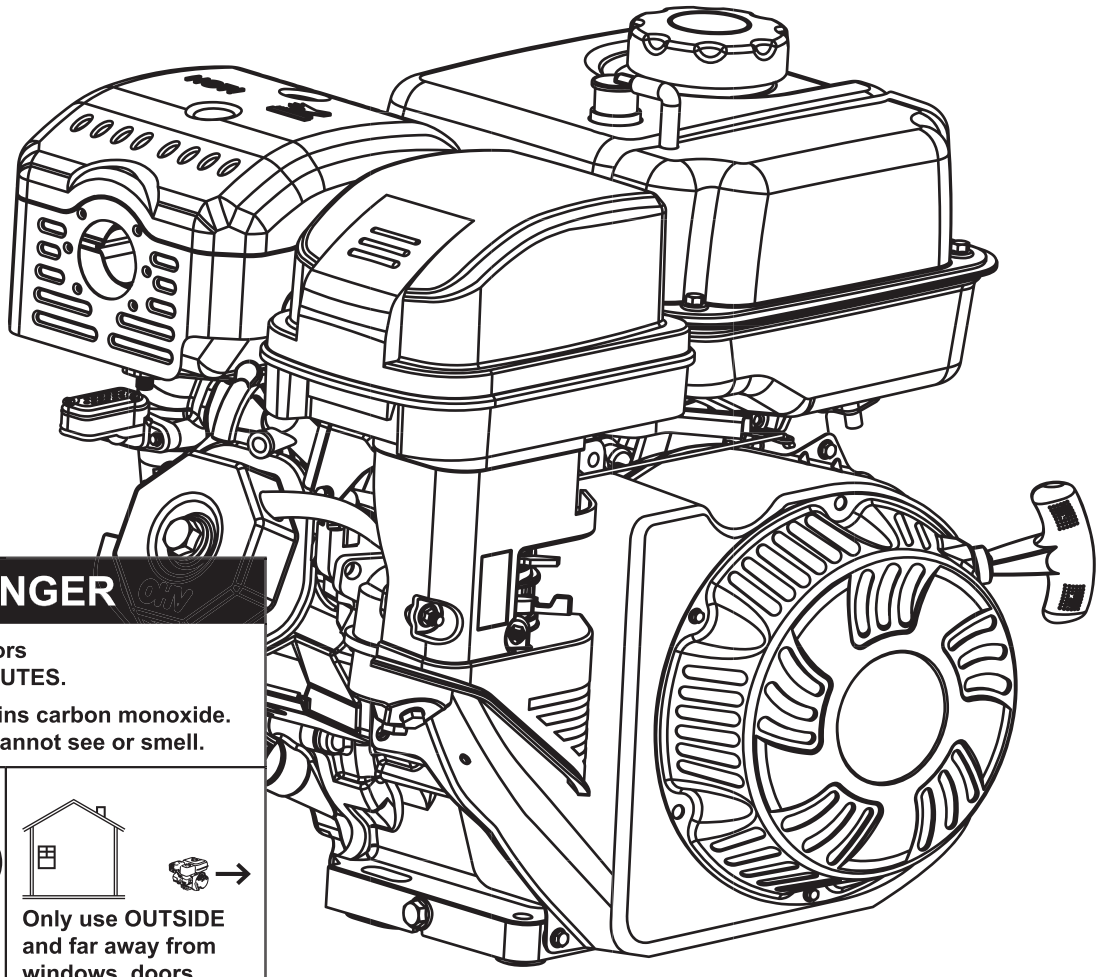
ii) Hoses, belts, connectors, and assemblies.

Owner's Manual & Safety Instructions

Save This Manual Keep this manual for the safety warnings and precautions, assembly, operating, inspection, maintenance and cleaning procedures. Write the product's serial number in the back of the manual near the assembly diagram (or month and year of purchase if product has no number). Keep this manual and the receipt in a safe and dry place for future reference.

PREDATOR™
ENGINES

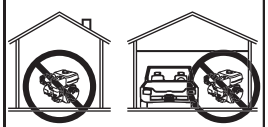
280cc
Horizontal Engine



⚠ DANGER

Using an engine indoors CAN KILL YOU IN MINUTES.

Engine exhaust contains carbon monoxide. This is a poison you cannot see or smell.



NEVER use inside a home or garage, EVEN IF doors and windows are open.

Only use OUTSIDE and far away from windows, doors, and vents.

Visit our website at: http://www.harborfreight.com
Email our technical support at: predator@harborfreight.com

REV 13a

When unpacking, make sure that the product is intact and undamaged.
If any parts are missing or broken,
please call 1-800-520-0882 as soon as possible.

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No portion of this manual or any artwork contained herein may be reproduced in any shape or form without the express written consent of Harbor Freight Tools.
Diagrams within this manual may not be drawn proportionally. Due to continuing improvements, actual product may differ slightly from the product described herein.
Tools required for assembly and service may not be included.

⚠WARNING

**Read this material before using this product.
Failure to do so can result in serious injury.
SAVE THIS MANUAL.**

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SAFETY

SETUP

OPERATION

MAINTENANCE

Specifications

Displacement		280cc
Engine Type		Horizontal Single Cylinder 4 Stroke OHV
Cooling System		Forced air cooled
Fuel	Type	87+ octane unleaded gasoline
	Capacity	1 Gallon
Engine Oil	Type SAE	10W-30 above 32° F 5W30 at 32° F or below
	Capacity	1.16 Quart
Run Time @ 50% Load with full tank		3 hours
Sound Level		106 dB
Bore x Stroke		78 mm x 58 mm
Compression Ratio		8.2:1
Rotation viewed from PTO (power takeoff - the output shaft)		Counterclockwise
Shaft	Shaft	1″ x 3.5″
	Keyway	1/4″ (6.3 mm)
	End Tapped	7/16 - 20
Spark Plug	Type	F6TC (Torch)
	Gap	0.7 - 0.8 mm
Valve Clearance	Intake	0.10 - 0.15 mm
	Exhaust	0.15 - 0.20 mm
Speed	Idle	1,800 ± 50 RPM

WARNING SYMBOLS AND DEFINITIONS	
⚠	This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.
⚠ DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE CAUTION	Addresses practices not related to personal injury.

Symbol Definitions

Symbol	Property or Statement
RPM	Revolutions Per Minute
HP	Horsepower
	WARNING marking concerning Risk of Eye Injury. Wear ANSI-approved safety goggles with side shields.
	Read the manual before set-up and/or use.
	WARNING marking concerning Risk of Hearing Loss. Wear hearing protection.

Symbol	Property or Statement
	WARNING marking concerning Risk of Respiratory Injury. Operate engine OUTSIDE and far away from windows, doors, and vents.
	WARNING marking concerning Risk of Fire while handling fuel. Do not smoke while handling fuel.
	WARNING marking concerning Risk of Fire. Do not refuel while operating. Keep flammable objects away from engine.

IMPORTANT SAFETY INSTRUCTIONS

WARNING! Read all instructions.
Failure to follow all instructions listed below may result in fire, serious injury and/or DEATH.
The warnings and precautions discussed in this manual cannot cover all possible conditions and situations that may occur. It must be understood by the operator that common sense and caution are factors which cannot be built into this product, but must be supplied by the operator.

SAVE THESE INSTRUCTIONS

Set up Precautions

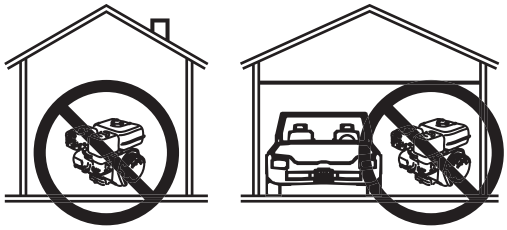
1. Gasoline fuel and fumes are flammable, and potentially explosive. Use proper fuel storage and handling procedures. Do not store fuel or other flammable materials nearby.
2. Have multiple ABC class fire extinguishers nearby.
3. Operation of this equipment may create sparks that can start fires around dry vegetation. A spark arrestor may be required. The operator should contact local fire agencies for laws or regulations relating to fire prevention requirements.
4. Set up and use only on a flat, level, well-ventilated surface.

5. Wear ANSI-approved safety goggles, heavy-duty work gloves, and dust mask/respirator during set up.
6. Use only lubricants and fuel recommended in the Specifications chart of this manual.

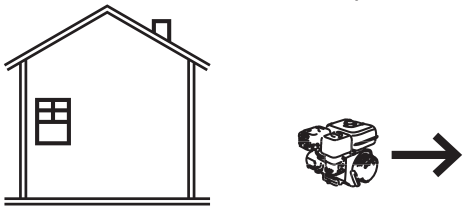
Operating Precautions

1.

CARBON MONOXIDE HAZARD
Using an engine indoors CAN KILL YOU IN MINUTES.
Engine exhaust contains carbon monoxide. This is a poison you cannot see or smell.



NEVER use inside a home or garage, EVEN IF doors and windows are open.



Only use OUTSIDE and far away from windows, doors, and vents.

2. Keep children away from the equipment, especially while it is operating.
3. Keep all spectators <u>at least six feet</u> from the Engine during operation.
4. Fire Hazard! Do not fill gas tank while engine is running. Do not operate if gasoline has been spilled. Clean spilled gasoline before starting engine. Do not operate near pilot light or open flame.
5. Do not touch engine during use. Let engine cool down after use.
6. Never store fuel or other flammable materials near the engine.
7. Only use a suitable means of transport and lifting devices with sufficient weight bearing capacity when transporting the Engine.
8. Secure the Engine on transport vehicles to prevent the tool from rolling, slipping, and tilting.
9. Industrial applications must follow OSHA requirements.
10. Do not leave the equipment unattended when it is running. Turn off the equipment (and remove safety keys, if available) before leaving the work area.
11. Engine can produce high noise levels. Prolonged exposure to noise levels above 85 dBA is hazardous to hearing. Always wear ear protection when operating or working around the gas engine while it is operating.
12. Wear ANSI-approved safety glasses, hearing protection, and NIOSH-approved dust mask/ respirator under a full face shield along with steel-toed work boots during use.
13. People with pacemakers should consult their physician(s) before use. Electromagnetic fields in close proximity to a heart pacemaker could cause pacemaker interference or pacemaker failure. Caution is necessary when near the engine's magneto or recoil starter.
14. Use only accessories that are recommended by Harbor Freight Tools for your model. Accessories that may be suitable for one piece of equipment may become hazardous when used on another piece of equipment.
15. Do not operate in explosive atmospheres, such as in the presence of flammable liquids, gases, or dust. Gasoline-powered engines may ignite the dust or fumes.
16. Stay alert, watch what you are doing and use common sense when operating this piece of equipment. Do not use this piece of equipment while tired or under the influence of drugs, alcohol or medication.
17. Do not overreach. Keep proper footing and balance at all times. This enables better control of the equipment in unexpected situations.
18. Dress properly. Do not wear loose clothing or jewelry. Keep hair, clothing and gloves away from moving parts. Loose clothes, jewelry or long hair can be caught in moving parts.
19. Parts, especially exhaust system components, get very hot during use. Stay clear of hot parts.
20. Do not cover the engine or equipment during operation.
21. Keep the equipment, engine, and surrounding area clean at all times.
22. Use the equipment, accessories, etc., in accordance with these instructions and in the manner intended for the particular type of equipment, taking into account the working conditions and the work to be performed. Use of the equipment for operations different from those intended could result in a hazardous situation.
23. Do not operate the equipment with known leaks in the engine's fuel system.
24. This product contains or, when used, produces a chemical known to the State of California to cause cancer and birth defects or other reproductive harm. (California Health & Safety Code § 25249.5, *et seq*.)

25. When spills of fuel or oil occur, they must be cleaned up immediately. Dispose of fluids and cleaning materials as per any local, state, or federal codes and regulations. Store oil rags in a bottom-ventilated, covered, metal container.
26. Keep hands and feet away from moving parts. Do not reach over or across equipment while operating.
27. Before use, check for misalignment or binding of moving parts, breakage of parts, and any other condition that may affect the equipment's operation. **If damaged, have the equipment serviced before using.** Many accidents are caused by poorly maintained equipment.
28. Use the correct equipment for the application. Do not modify the equipment and do not use the equipment for a purpose for which it is not intended.

Service Precautions

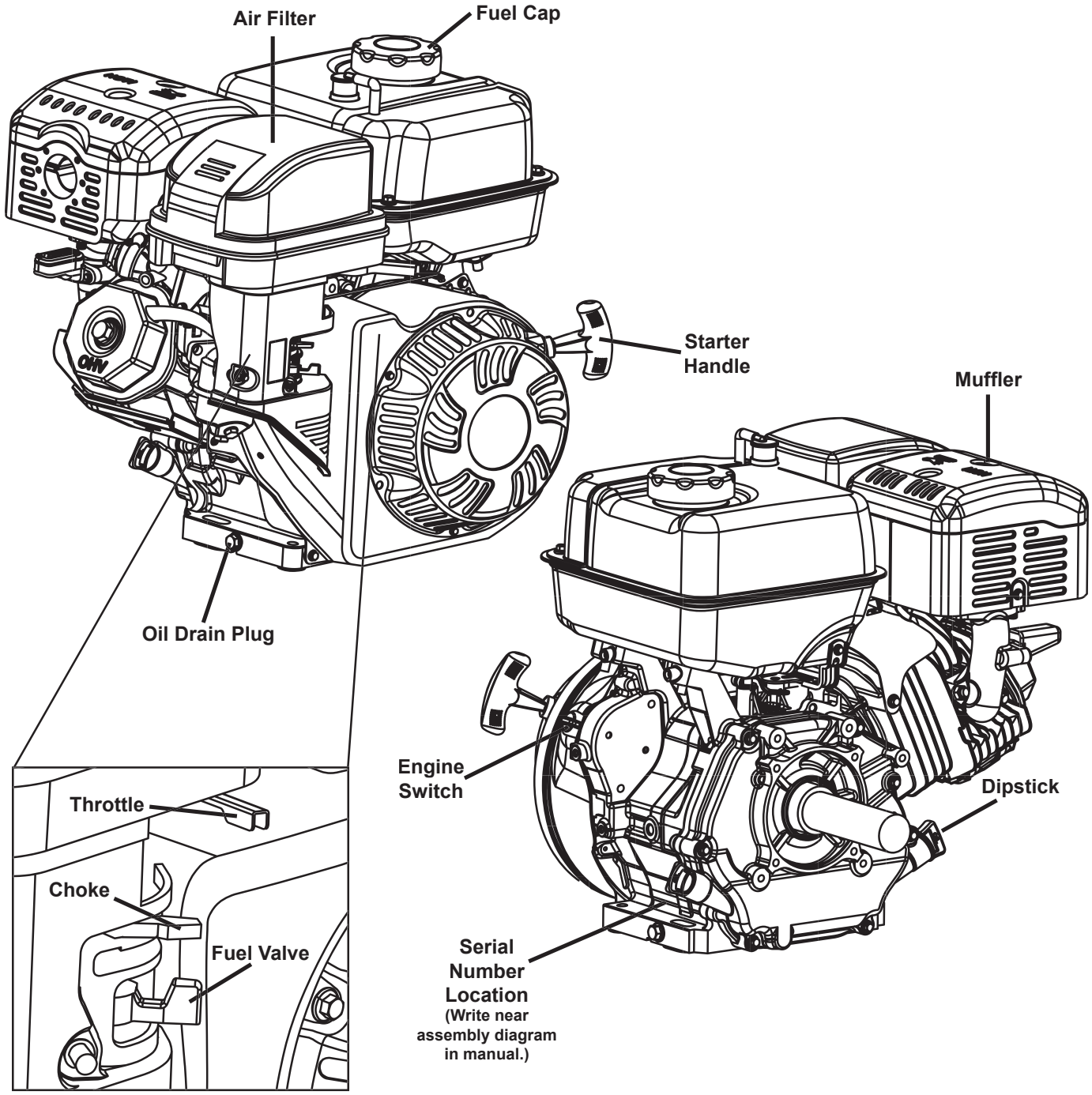
1. **Before service, maintenance, or cleaning:**
   a. **Turn the engine switch to its "OFF" position.**
   b. **Allow the engine to completely cool.**
   c. **Then, remove the spark plug cap from the spark plug.**
2. Keep all safety guards in place and in proper working order. Safety guards include muffler, air cleaner, mechanical guards, and heat shields, among other guards.
3. **Do not alter or adjust any part of the equipment or its engine that is sealed by the manufacturer or distributor. Only a qualified service technician may adjust parts that may increase or decrease governed engine speed.**
4. Wear ANSI-approved safety goggles, heavy-duty work gloves, and dust mask/respirator during service.
5. Maintain labels and nameplates on the equipment. These carry important information. If unreadable or missing, contact Harbor Freight Tools for a replacement.
6. Have the equipment serviced by a qualified repair person using only identical replacement parts. This will ensure that the safety of the equipment is maintained. Do not attempt any service or maintenance procedures not explained in this manual or any procedures that you are uncertain about your ability to perform safely or correctly.
7. Store equipment out of the reach of children.
8. Follow scheduled engine and equipment maintenance.

Refueling:

1. Do not smoke, or allow sparks, flames, or other sources of ignition around the equipment, especially when refuelling.
2. Do not refill the fuel tank while the engine is running or hot.
3. Do not fill fuel tank to the top. Leave a little room for the fuel to expand as needed.
4. Refuel in a well-ventilated area only.
5. Wipe up any spilled fuel and allow excess to evaporate before starting engine. **To prevent FIRE, do not start the engine while the smell of fuel hangs in the air.**

SAVE THESE INSTRUCTIONS.

Engine Controls



Set Up

The emission control system for this engine is warranted for standards set by the U.S. Environmental Protection Agency. For warranty information, refer to the last pages of this manual.

Read the ENTIRE IMPORTANT SAFETY INFORMATION section at the beginning of this manual including all text under subheadings therein before set up or use of this product.

⚠WARNING

TO PREVENT SERIOUS INJURY:
Operate only with proper spark arrestor installed.

Operation of this equipment may create sparks that can start fires around dry vegetation. A spark arrestor may be required.
The operator should contact local fire agencies for laws or regulations relating to fire prevention requirements.

At high altitudes, the engine's carburetor, governor (if so equipped), and any other parts that control the fuel-air ratio will need to be adjusted by a qualified mechanic to allow efficient high-altitude use and to prevent damage to the engine and any other devices used with this product.

WARNING! DO NOT INSTALL THIS ENGINE ON A VEHICLE.

WARNING! INSTALL THIS ENGINE ACCORDING TO EQUIPMENT INSTRUCTIONS BEFORE USE.

Read the ENTIRE IMPORTANT SAFETY INFORMATION section at the beginning of this manual including all text under subheadings therein before set up or use of this product.

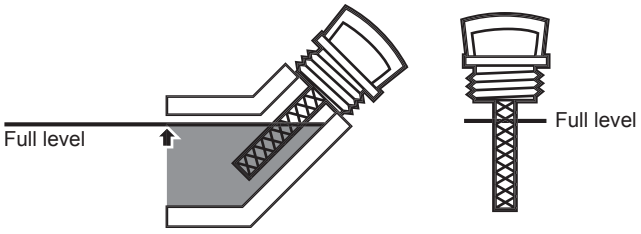
Pre-Start Checks

Inspect engine and equipment looking for damaged, loose, and missing parts before set up and starting. If any problems are found, do not use equipment until fixed properly.

Checking and Filling Engine Oil

CAUTION! Your Warranty is VOID if the engine's crankcase is not properly filled with oil before each use. Before each use, check the oil level. Do not run the engine with low or no engine oil. Running the engine with no or low engine oil WILL permanently damage the engine.

1. Make sure the engine is stopped and is level.
2. Close the Fuel Valve.
3. Clean the top of the Dipstick and the area around it. Remove the Dipstick by threading it counterclockwise, and wipe it off with a clean lint free rag.



4. Reinsert the Dipstick without threading it in and remove it to check the oil level. The oil level should be up to the full level as shown above.
5. If the oil level is at or below the low mark add the appropriate type of oil until the oil level is at the proper level. SAE 10W-30 oil is recommended for general use. (The SAE Viscosity Grade chart on page 12 in the Service section shows other viscosities to use in different average temperatures.)
6. Thread the dipstick back in clockwise.

CAUTION! Do not run the engine with too little oil. The engine will be permanently damaged.

Checking and Filling Fuel

⚠WARNING! TO PREVENT SERIOUS INJURY FROM FIRE:
Fill the fuel tank in a well-ventilated area away from ignition sources. If the engine is hot from use, shut the engine off and wait for it to cool before adding fuel.
Do not smoke.

1. Clean the Fuel Cap and the area around it.
2. Unscrew and remove the Fuel Cap.
3. If needed, fill the Fuel Tank to about 1 inch under the fill neck of the Fuel Tank with 87+ octane unleaded gasoline.

Note: Do not use gasoline containing more than 10% ethanol (E10). Do not use E85 ethanol.

Note: Do not use gasoline that has been stored in a metal fuel container or a dirty fuel container. It can cause particles to enter the carburetor, effecting engine performance and/or causing damage.

4. Then replace the Fuel Cap.
5. Wipe up any spilled fuel and allow excess to evaporate before starting engine. To prevent FIRE, do not start the engine while the smell of fuel hangs in the air.

Starting the Engine

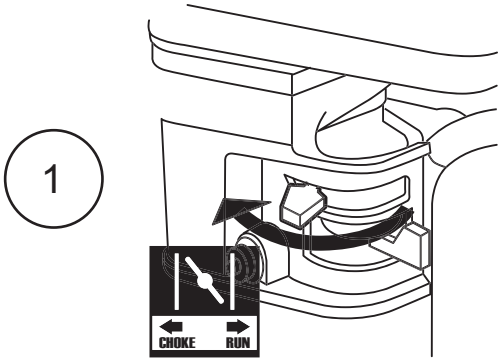
Before Starting the Engine

Before starting the engine:

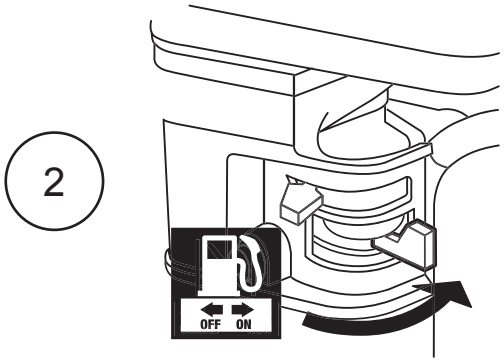
a. **Follow the Set Up Instructions in the equipment manual to prepare the equipment.**
b. **Inspect the equipment and engine.**
c. **Fill the engine with the proper amount and type of both fuel and oil.**
d. **Read the Equipment Operation section in the equipment manual.**

Manual Start

1. To start a cold engine, move the Choke to the CHOKE position.
   To restart a warm engine, leave the Choke in the RUN position.



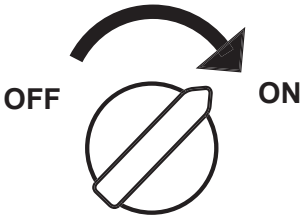
2. Open the Fuel Valve.

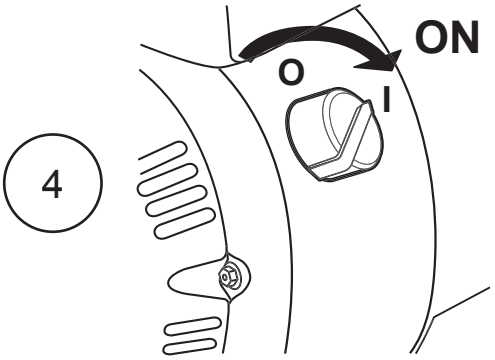


3. Slide the Throttle or Speed Control Lever to 1/3 away from the SLOW position (the “turtle”).

Note: Some tools have a Speed Control Lever located elsewhere on the tool which functions the same as the Throttle. Use the Speed Control Lever in place of the Throttle when the tool is so equipped.

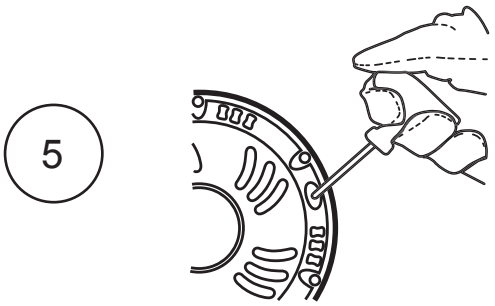
4. Turn the Engine Switch on.



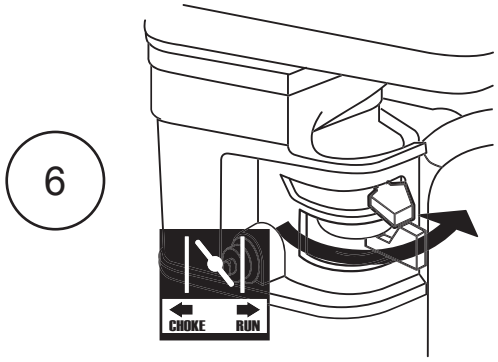


5. Grip the Starter Handle of the Engine loosely and pull it slowly several times to allow the gasoline to flow into the Engine’s carburetor. Then pull the Starter Handle gently until resistance is felt. Allow Cable to retract fully and then pull it quickly. Repeat until the engine starts.

Note: Do not let the Starter Handle snap back against the engine. Hold it as it recoils so it doesn't hit the engine.



6. Allow the Engine to run for several seconds. Then, if the Choke Lever is in the CHOKE position, move the Choke Lever very slowly to its RUN position.



Note: Moving the Choke Lever too fast could stall the engine.

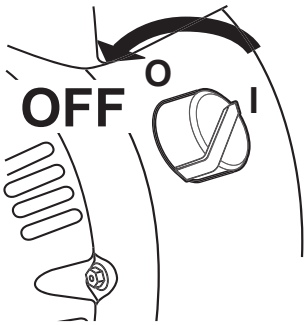
IMPORTANT: Allow the engine to run at no load for five minutes with no load after each start-up so that the engine can stabilize.

7. Adjust the Throttle as needed.
8. **Break-in Period:**
   a. Breaking-in the engine will help to ensure proper equipment and engine operation.
   b. The operational break-in period will last about 3 hours of use. During this period:
      • Do not apply a heavy load to the equipment.
      • Do not operate the engine at its maximum speed.
   c. The maintenance break-in period will last about 20 hours of use. After this period:
      • Change the engine oil.

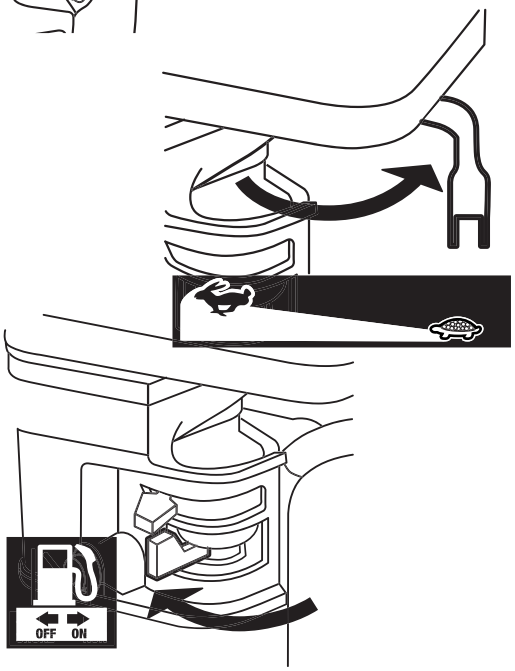
   Under normal operating conditions subsequent maintenance follows the schedule explained in the MAINTENANCE AND SERVICING section.

Stopping the Engine

1. To stop the engine in an emergency, turn the Engine Switch off.



2. Under normal conditions, use the following procedure:
   a. Slide the Throttle or Speed Control Lever to SLOW (the “turtle”).
   b. Turn the Engine Switch off.
   c. Close the Fuel Valve.



⚠WARNING

TO PREVENT SERIOUS INJURY FROM ACCIDENTAL STARTING:
Turn the Power Switch of the equipment to its "OFF" position, wait for the engine to cool, and disconnect the spark plug cap before performing any inspection, maintenance, or cleaning procedures.

TO PREVENT SERIOUS INJURY FROM EQUIPMENT FAILURE:
Do not use damaged equipment. If abnormal noise, vibration, or excess smoking occurs, have the problem corrected before further use.

Follow all service instructions in this manual. The engine may fail critically if not serviced properly.

Cleaning, Maintenance, and Lubrication Schedule

Note: This maintenance schedule is intended solely as a general guide. If performance decreases or if equipment operates unusually, check systems immediately. The maintenance needs of each piece of equipment will differ depending on factors such as duty cycle, temperature, air quality, fuel quality, and other factors.

Note: The following procedures are in addition to the regular checks and maintenance explained as part of the regular operation of the engine and equipment.

Procedure	Before Each Use	Monthly or every 20 hr. of use	Every 3 mo. or 50 hr. of use	Every 6 mo. or 100 hr. of use	Yearly or every 300 hr. of use	Every 2 Years
Brush off outside of engine	✓	✓	✓	✓	✓	✓
Check engine oil level	✓	✓	✓	✓	✓	✓
Check air cleaner	✓		✓	✓	✓	✓
Check deposit cup	✓			✓	✓	✓
Change engine oil		✓		✓	✓	✓
Clean/replace air cleaner			✓*	✓	✓	✓
Check and clean spark plug				✓	✓	✓
1. Check/adjust idle speed 2. Check/adjust valve clearance 3. Clean fuel tank, strainer and carburetor 4. Clean carbon build-up from combustion chamber					✓**	✓**
Replace fuel line if necessary						✓**

*Service more frequently when used in dusty areas.

**These items should be serviced by a qualified technician.

Maintenance Procedures

Many maintenance procedures, including any not detailed in this manual, will need to be performed by a qualified technician for safety. If you have any doubts about your ability to safely service the equipment or engine, have a qualified technician service the equipment instead.

Checking and Filling Fuel

⚠WARNING! TO PREVENT SERIOUS INJURY FROM FIRE:
Fill the fuel tank in a well-ventilated area away from ignition sources. If the engine is hot from use, shut the engine off and wait for it to cool before adding fuel.
Do not smoke.

1. Clean the Fuel Cap and the area around it.
2. Unscrew and remove the Fuel Cap.
3. If needed, fill the Fuel Tank to about 1 inch under the fill neck of the Fuel Tank with 87+ octane unleaded gasoline.

Note: Do not use gasoline containing more than 10% ethanol (E10). Do not use E85 ethanol.

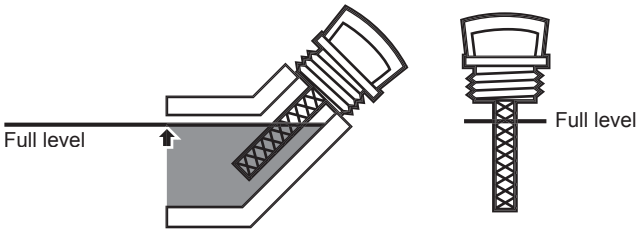
Note: Do not use gasoline that has been stored in a metal fuel container or a dirty fuel container. It can cause particles to enter the carburetor, effecting engine performance and/or causing damage.

4. Then replace the Fuel Cap.
5. Wipe up any spilled fuel and allow excess to evaporate before starting engine. To prevent FIRE, do not start the engine while the smell of fuel hangs in the air.

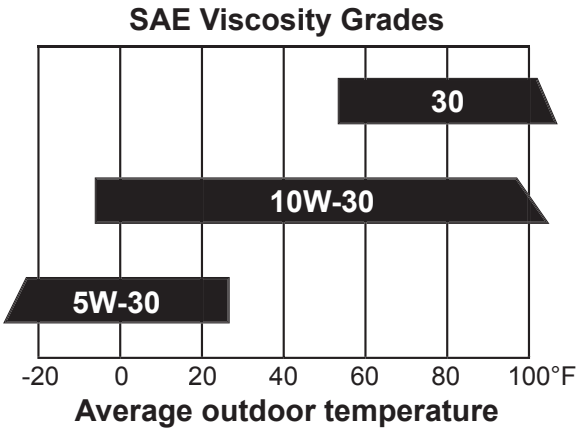
Engine Oil Change

⚠CAUTION! Oil is very hot during operation and can cause burns. Wait for engine to cool before changing oil.

1. Make sure the engine is stopped and is level.
2. Close the Fuel Valve.
3. Place a drain pan (not included) underneath the crankcase's drain plug.
4. Remove the drain plug and, if possible, tilt the crankcase slightly to help drain the oil out. Recycle used oil.
5. Replace the drain plug and tighten it.
6. Clean the top of the Dipstick and the area around it. Remove the Dipstick by threading it counterclockwise, and wipe it off with a clean lint free rag.



7. Add the appropriate type of oil until the oil level is at the full level. SAE 10W-30 oil is recommended for general use.
The SAE Viscosity Grade chart shows other viscosities to use in different average temperatures.



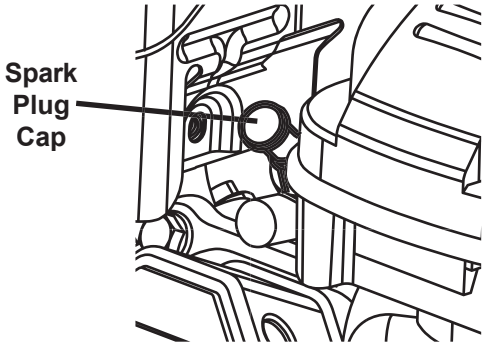
8. Thread the dipstick back in clockwise.

CAUTION! Do not run the engine with too little oil. The engine will be permanently damaged.

Air Filter Element Maintenance

1. Remove the air filter cover and the air filter elements and check for dirt. Clean or replace as described below.
2. **Cleaning:**
   - For "paper" filter elements:
     To prevent injury from dust and debris, wear ANSI-approved safety goggles, NIOSH-approved dust mask/respirator, and heavy-duty work gloves. In a well-ventilated area away from bystanders, use pressurized air to blow dust out of the air filter. If this does not get the filter clean, replace it.
   - For foam filter elements:
     Wash the element in warm water and mild detergent several times. Rinse. Squeeze out excess water and allow it to dry completely. Soak the filter in lightweight oil briefly, then squeeze out the excess oil.
3. Install the new filter or the cleaned filter. Secure the Air Cleaner Cover before use.

Spark Plug Maintenance



1. Disconnect spark plug cap from end of plug. Clean out debris from around spark plug.
2. Using a spark plug wrench, remove the spark plug.
3. Inspect the spark plug:
   If the electrode is oily, clean it using a clean, dry rag. If the electrode has deposits on it, polish it using emery paper. If the white insulator is cracked or chipped, the spark plug needs to be replaced.

NOTICE: Recommended Spark Plugs:
F6TC (Torch)
Using an incorrect spark plug may damage the engine.

4. When installing a new spark plug, adjust the plug's gap to the specification on the Specifications chart. Do not pry against the electrode, the spark plug can be damaged.
5. Install the new spark plug or the cleaned spark plug into the engine.
   Gasket-style: Finger-tighten until the gasket contacts the cylinder head, then about 1/2-2/3 turn more.
   Non-gasket-style: Finger-tighten until the plug contacts the head, then about 1/16 turn more.

NOTICE: Tighten the spark plug properly. If loose, the spark plug will cause the engine to overheat. If overtightened, the threads in the engine block will be damaged.

6. Apply dielectric spark plug boot protector (not included) to the end of the spark plug and reattach the wire securely.

Storage

When the equipment is to remain idle for longer than 20 days, prepare the engine for storage as follows:

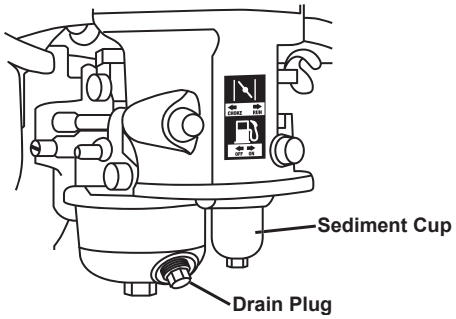
1. **CLEANING**:
   Wait for engine to cool, then clean engine with dry cloth.

NOTICE: Do not clean using water. The water will gradually enter the engine and cause rust damage. Apply a thin coat of rust preventive oil to all metal parts.

2. **FUEL:**

⚠WARNING! TO PREVENT SERIOUS INJURY FROM FIRE:
Drain the fuel tank in a well-ventilated area away from ignition sources. If the engine is hot from use, shut the engine off and wait for it to cool before draining fuel.
Do not smoke.

   a. Place a funnel leading to a proper gasoline container below the carburetor.



   b. Remove the drain bolt from the bottom of the carburetor bowl and allow the fuel to drain.
   c. Remove the small sediment cup next to the bowl and allow the fuel to drain from there as well.
   d. Open the fuel valve. After all fuel has drained, reinstall the drain bolt and sediment cup. Tighten securely.

3. **LUBRICATION:**
   a. Change engine oil.
   b. Clean out area around spark plug. Remove spark plug and pour one tablespoon of engine oil into cylinder through spark plug hole.
   c. Replace spark plug, but leave spark plug cap disconnected.
   d. Pull Starter Handle to distribute oil in cylinder. Stop after one or two revolutions when you feel the piston start the compression stroke (when you start to feel resistance).
4. **STORAGE AREA:**
   Cover and store in a dry, level, well-ventilated area out of reach of children. Storage area should also be away from ignition sources, such as water heaters, clothes dryers, and furnaces.
5. **AFTER STORAGE:**
   Before starting the engine after storage, keep in mind that untreated gasoline will deteriorate quickly. Drain the fuel tank and change to fresh fuel if untreated gasoline has been sitting for a month, if treated gasoline has been sitting beyond the fuel stabilizer's recommended time period, or if the engine does not start.

Troubleshooting

Problem	Possible Causes	Probable Solutions
Engine will not start	FUEL RELATED:	FUEL RELATED:
	1. No fuel in tank or fuel valve closed.	1. Fill fuel tank and open fuel valve.
	2. Choke not in CHOKE position, cold engine.	2. Move Choke to CHOKE position.
	3. Gasoline with more than 10% ethanol used. (E15, E20, E85, etc.)	3. Clean out ethanol rich gasoline from fuel system. Replace components damaged by ethanol. Use fresh 87+ octane unleaded gasoline only. **Do not use gasoline with more than 10% ethanol (E15, E20, E85, etc.).**
	4. Low quality or deteriorated, old gasoline.	4. Use fresh 87+ octane unleaded gasoline only. **Do not use gasoline with more than 10% ethanol (E15, E20, E85, etc.).**
	5. Carburetor not primed.	5. Pull on Starter Handle to prime.
	6. Dirty fuel passageways.	6. Clean out passageways using fuel additive. Heavy deposits may require further cleaning.
	7. Carburetor needle stuck. Fuel can be smelled in the air.	7. **Gently** tap side of carburetor float chamber with screwdriver handle.
	8. Too much fuel in chamber. This can be caused by the carburetor needle sticking.	8. Turn Choke to RUN position. Remove spark plug and pull the start handle several times to air out the chamber. Reinstall spark plug and set Choke to CHOKE position.
	9. Clogged Fuel Filter.	9. Replace Fuel Filter.
	IGNITION (SPARK) RELATED:	IGNITION (SPARK) RELATED:
	1. Spark plug cap not connected securely.	1. Connect spark plug cap properly.
	2. Spark plug electrode wet or dirty.	2. Clean spark plug.
	3. Incorrect spark plug gap.	3. Correct spark plug gap.
	4. Spark plug cap broken.	4. Replace spark plug cap.
	5. Incorrect spark timing or faulty ignition system.	5. Have qualified technician diagnose/ repair ignition system.
	COMPRESSION RELATED:	COMPRESSION RELATED:
	1. Cylinder not lubricated. Problem after long storage periods.	1. Pour tablespoon of oil into spark plug hole. Crank engine a few times and try to start again.
	2. Loose or broken spark plug. (Hissing noise will occur when trying to start.)	2. Tighten spark plug. If that does not work, replace spark plug. If problem persists, may have head gasket problem, see #3.
	3. Loose cylinder head or damaged head gasket. (Hissing noise will occur when trying to start.)	3. Tighten head. If that does not remedy problem, replace head gasket.
	4. Engine valves or tappets mis-adjusted or stuck.	4. Have qualified technician diagnose/ repair ignition system.

Follow all safety precautions whenever diagnosing or servicing the equipment or engine.

Problem	Possible Causes	Probable Solutions
Engine misfires	1. Spark plug cap loose. 2. Incorrect spark plug gap or damaged spark plug. 3. Defective spark plug cap. 4. Old or low quality gasoline. 5. Incorrect compression.	1. Check wire connections. 2. Re-gap or replace spark plug. 3. Replace spark plug cap. 4. Use fresh 87+ octane unleaded gasoline only. **Do not use gasoline with more than 10% ethanol (E15, E20, E85, etc.).** 5. Diagnose and repair compression. (Use **Engine will not start: COMPRESSION RELATED** section.)
Engine stops suddenly	1. Low oil shutdown. 2. Fuel tank empty or full of impure or low quality gasoline. 3. Defective fuel tank cap creating vacuum, preventing proper fuel flow. 4. Faulty magneto. 5. Disconnected or improperly connected spark plug cap.	1. Fill engine oil to proper level. Check engine oil before EVERY use. 2. Fill fuel tank with fresh 87+ octane unleaded gasoline only. **Do not use gasoline with more than 10% ethanol (E15, E20, E85, etc.).** 3. Test/replace fuel tank cap. 4. Have qualified technician service magneto. 5. Secure spark plug cap.
Engine stops when under heavy load	1. Dirty air filter 2. Engine running cold.	1. Clean or replace element. 2. Allow engine to warm up prior to operating equipment.
Engine knocks	1. Old or low quality gasoline. 2. Engine overloaded. 3. Incorrect spark timing, deposit buildup, worn engine, or other mechanical problems.	1. Fill fuel tank with fresh 87+ octane unleaded gasoline only. **Do not use gasoline with more than 10% ethanol (E15, E20, E85, etc.).** 2. Do not exceed equipment's load rating. 3. Have qualified technician diagnose and service engine.
Engine backfires	1. Impure or low quality gasoline. 2. Engine too cold. 3. Intake valve stuck or overheated engine. 4. Incorrect timing.	1. Fill fuel tank with fresh 87+ octane unleaded gasoline only. **Do not use gasoline with more than 10% ethanol (E15, E20, E85, etc.).** 2. Use cold weather fuel and oil additives to prevent backfiring. 3. Have qualified technician diagnose and service engine. 4. Check engine timing.

Follow all safety precautions whenever diagnosing or servicing the equipment or engine.

Limited 90 Day Warranty

Harbor Freight Tools Co. makes every effort to assure that its products meet high quality and durability standards, and warrants to the original purchaser that this product is free from defects in materials and workmanship for the period of 90 days from the date of purchase. This warranty does not apply to damage due directly or indirectly, to misuse, abuse, negligence or accidents, repairs or alterations outside our facilities, criminal activity, improper installation, normal wear and tear, or to lack of maintenance. We shall in no event be liable for death, injuries to persons or property, or for incidental, contingent, special or consequential damages arising from the use of our product. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation of exclusion may not apply to you. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

To take advantage of this warranty, the product or part must be returned to us with transportation charges prepaid. Proof of purchase date and an explanation of the complaint must accompany the merchandise. If our inspection verifies the defect, we will either repair or replace the product at our election or we may elect to refund the purchase price if we cannot readily and quickly provide you with a replacement. We will return repaired products at our expense, but if we determine there is no defect, or that the defect resulted from causes not within the scope of our warranty, then you must bear the cost of returning the product.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

3491 Mission Oaks Blvd. • PO Box 6009 • Camarillo, CA 93011 • (800) 520-0882

Emission Control System Warranty

United States Emission Control Defects Warranty Statement

The United States Environmental Protection Agency (herein EPA) and Harbor Freight Tools (herein HFT) are pleased to explain the emission control system warranty on your 2013 and later Small Off-Road Engine (herein engine). Within the United States, new off-road, spark-ignition engines certified for model year 2013 and later, must be designed, built and equipped to meet the stringent anti-smog standards set forth by the EPA. HFT must warrant the emission control system on your engine for the periods of time described below, provided there has been no abuse, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the carburetor or fuel-injection system, and the ignition system. Also included may be hoses, belts, connectors and other emission-related assemblies.

Where a warrantable condition exists, HFT will repair your engine at no cost to you including diagnosis, parts and labor.

Manufacturer's Warranty Coverage

The 2013 and later engines are warranted for two (2) years. If any emission-related part on your engine is defective, the part will be repaired or replaced by HFT.

Harbor Freight Tools Emission Control Defects Warranty Coverage

Engines are warranted for a period of two (2) years relative to emission control parts defects, subject to the provisions set forth below. If any emission related part on your engine is defective, the part will be repaired or replaced by HFT.

Owner's Warranty Responsibilities

- As the engine owner, you are responsible for the performance of the required maintenance listed in your Owner's Manual. HFT recommends that you retain all receipts covering maintenance on your engine, but HFT cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.
- As the engine owner, you should, however, be aware that HFT may deny you warranty coverage if your engine or a part has failed due to abuse, neglect, improper maintenance, or unapproved modifications.
- You are responsible for shipping your engine to a HFT warranty station as soon as a problem exists. Contact the HFT Customer Service department at the number below to make shipping arrangements. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days.

If you have any questions regarding your warranty rights and responsibilities, you should contact the Harbor Freight Tools Customer Service Department at 1-800-520-0882.

Harbor Freight Tools Emission Control Defects Warranty Provisions

1. Length of Coverage

HFT warrants to a first retail purchaser and each subsequent purchaser that the engine is free from defects in materials and workmanship that cause the failure of warranted parts for a period of two (2) years after the date of delivery to the first retail purchaser.

2. No Charge Repair or Replacement

Repair or replacement of any warranted part will be performed at no charge to the owner if the work is performed through a warranty station authorized by HFT. For emissions warranty service, contact the HFT Customer Service Department at 1-800-520-0882.

3. Consequential Damages Coverage

Coverage under this warranty shall also extend to the failure of any engine components caused by the failure of any warranted part while it is still covered under this warranty.

4. Coverage Exclusions

Warranty claims shall be filed in accordance with the provisions of the HFT warranty policy explained in the box at the top of the previous page. HFT shall not be liable for any loss of use of the engine, for any alternative usage, for any damage to goods, loss of time, or inconvenience. Warranty coverage shall also be excluded for any part which fails, malfunctions, or is damaged due to failure to follow the maintenance and operating instructions set forth in the Owner's Manual including, but not limited to:

a) Use of parts which are not authorized by HFT

b) Improper installation, adjustment or repair of the engine or of any warranted part unless performed by an authorized warranty center

c) Failure to follow recommendations on fuel use contained in the Owner's Manual

d) Improper or inadequate maintenance of any warranted parts

e) Repairs performed outside of the authorized warranty service dealers

f) Alterations by changing, adding to or removing parts from the engine.

5. Service and Maintenance

Component parts which are not scheduled for replacement as required maintenance or are scheduled only for regular inspection to the effect of "repair or replace as necessary" are warranted for the warranty period. Any warranted part which is scheduled for replacement as required maintenance is warranted for the period of time up to the first scheduled replacement point for that part. Any replacement part, provided it is equivalent in durability and performance, may be used in performance of maintenance or repairs. The owner is responsible for commissioning a qualified technician/ mechanic to perform all required maintenance, as outlined in the Inspection, Cleaning, and Maintenance section in this manual.

6. Warranted Parts

1) Fuel Metering System

i) Carburetor and its internal parts.

ii) Air/fuel ratio feedback and control system.

iii) Cold start enrichment system.

iv) Fuel Tank.

2) Air Induction System

i) Controlled hot air intake system.

ii) Intake manifold.

iii) Air filter.

3) Ignition System

i) Spark Plugs.

ii) Magneto or electronic ignition system.

iii) Spark advance/retard system.

4) Exhaust Gas Recirculation (EGR) System (if so equipped)

i) EGR valve body, and carburetor spacer.

ii) EGR rate feedback and control system.

5) Air Injection System

i) Air pump or pulse valve.

ii) Valves affecting distribution of flow.

iii) Distribution manifold.

6) Catalyst or Thermal Reactor System (if so equipped)

i) Catalytic converter.

ii) Thermal reactor.

iii) Exhaust manifold.

7) Particulate Controls

Traps, filters, precipitators, and any other device used to capture particulate emissions.

Parts List

Part	Description	Qty
1	Gasket, Cylinder Head	1
2	Cover Asm., Head	1
3	Gasket, Head Cover	1
4	Tube, Breather	1
5	Bolt Asm., Head Cover	1
6	Stud	2
7	Stud	2
8	Pin	2
9	Bolt, Cylinder Head	4
10	Plug, Spark	1
11	Head Asm., Cylinder	1
12	Crankcase Asm.	1
13	Seal, Oil	1
14	Sensor, Engine Oil	1
15	Frame, Fuel Tank Inst.	1
16	Plug, Rubber	1
17	Protector, Oil	1
18	Bolt	1
19	Washer, Flat	2
20	Bolt, Drain Plug	2
21	Clip	1
22	Arm, Governor	1
23	Washer, Flat	1
24	Pin	1
25	Bolt	4
26	Bolt	2
27	Cover, Crankcase	1
28	Gasket, Crankcase	1
29	Plug Asm., Engine Oil	1
30	Dipstick Asm., Oil	1
31	Pin	2
32	Bolt	7
33	Bearing	1
34	Gear Asm., Governor	1
35	Seal, Oil	1
36	Crankshaft Asm.	1
37	Ring Set, Oil	1
38	Clip, Piston Pin	2
39	Piston	1

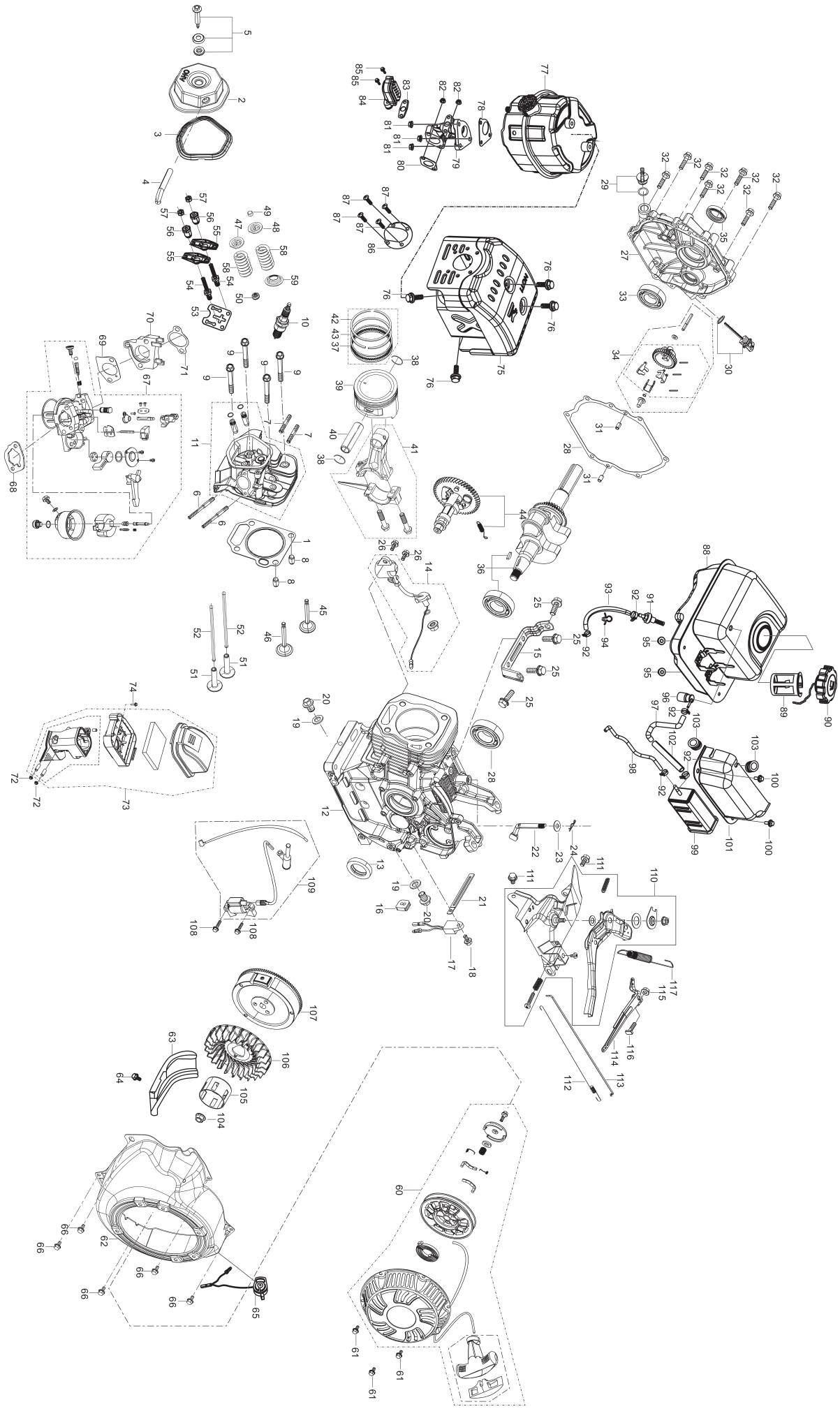
Part	Description	Qty
40	Pin, Piston	1
41	Rod, Connecting	1
42	Ring, Primary	1
43	Ring, Secondary	1
44	Camshaft Asm.	1
45	Valve, Exhaust	1
46	Valve, Intake	1
47	Seat, Valve Spring	1
48	Retainer, Exhaust Valve	1
49	Rotator, Valve	1
50	Guide, Seal	1
51	Tappet, Valve	2
52	Lifter Asm., Valve	2
53	Plate Asm., Lifter Stopper	1
54	Bolt, Valve Adjusting	2
55	Rocker, Valve	2
56	Nut, Valve Adjusting	2
57	Nut, Valve Lock	2
58	Spring, Valve	2
59	Retainer, Valve Spring	1
60	Starter Asm., Recoil	1
61	Bolt	3
62	Shroud	1
63	Shroud, Cylinder Body	1
64	Bolt	1
65	Switch Asm., Stop Engine	1
66	Bolt	5
67	Carburetor Asm.	1
68	Gasket, Air Cleaner	1
69	Gasket, Carburetor	1
70	Plate, Carb. Insulator	1
71	Gasket, Inlet	1
72	Nut	2
73	Cleaner, Air	1
74	Bolt	1
75	Cover, Muffler Outer	1
76	Bolt	4
77	Muffler Body	1
78	Gasket, Muffler	1

Part	Description	Qty
79	Pipe, Exhaust	1
80	Gasket, Exhaust Outlet	1
81	Nut	3
82	Nut	2
83	Gasket, 2nd Intake Valve	1
84	Valve, 2nd Air Intake	1
85	Bolt	2
86	Shroud, Muffler	1
87	Screw	2
88	Tank, Fuel	1
89	Strainer, Fuel	1
90	Cover, Fuel Tank	1
91	Outlet Asm., Fuel Tank Oil	1
92	Clamp	5
93	Tube, Fuel	1
94	Clip	1
95	Nut	2
96	Valve, One Way	1
97	Hose, Vapor Rubber	1
98	Hose, Air Cleaner Rubber	1
99	Collector, Vapor	1
100	Bolt	2
101	Cover, Vapor Collector	1
102	Jacket	1
103	Jacket	2
104	Nut, Flywheel	1
105	Pulley, Starter	1
106	Impeller	1
107	Flywheel Asm.	1
108	Bolt	2
109	Coil, Ignition	1
110	Control Asm., Throttle	1
111	Bolt	2
112	Spring, Throttle Valve Rtn.	1
113	Rod, Governor	1
114	Support Asm., Governor	1
115	Nut	1
116	Bolt, Governor Support	1
117	Spring, Governor	1

Record Product's Serial Number Here:_____
Note: If product has no serial number, record month and year of purchase instead.

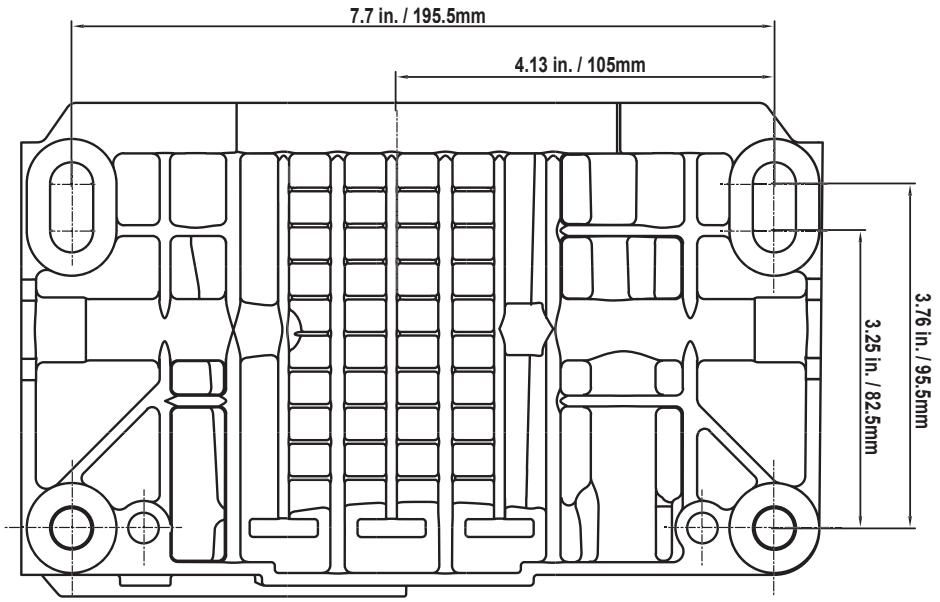
Note: Some parts are listed and shown for illustration purposes only, and are not available individually as replacement parts.

Assembly Diagram



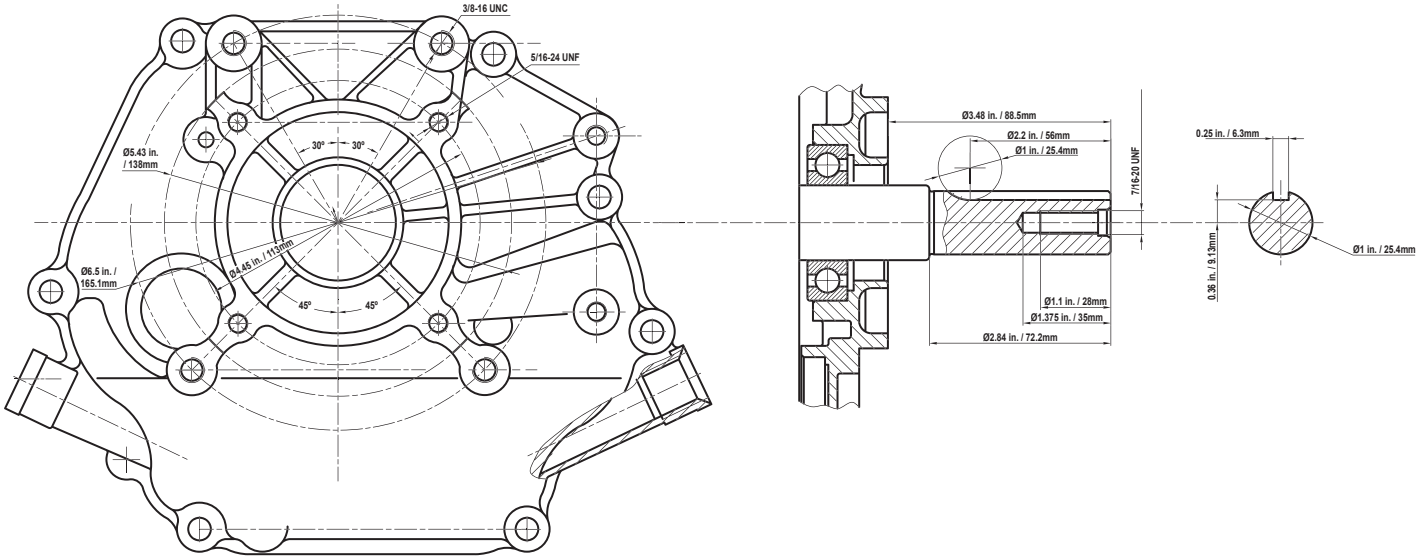
Mounting Hole Diagram

Note: Not to scale.



Power Take-Off Diagram

Note: Not to scale.



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